PB-230 552

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN. PROCEEDINGS OF CONFERENCE, SESSION (3RD) HELD AT MILWAUKEE, WISCONSIN, ON MARCH 31-APRIL 1, 1970. VOLUME 2

Federal Water Quality Administration
Washington, D. C.

1 April 1970

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PB 230 552

THIRD SESSION
OF THE
CONFERENCE
IN THE MATTER OF POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN

held in
Milwaukee, Wisconsin
March 31 - April 1, 1970

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AGAINST VIOLENCE
TO THE
ENVIRONMENT
BOX 84
GLENCOE, ILLINOIS 60022

Steering Committee
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MRS. FRANKLIN P. COLE 831-3042
RICHARD M. DeVIERMAN 945-6552
MR. ROBERT FERMANIS 433-3638
MR. ROBERT HILLMAN 831-2193
MR. DALE SCHLAFER 433-0321
MR. MICHAEL SWEENEY 945-4937
MR. HOWARD SWEIG 831-4477
MR. BERNARD VERIN 432-6680

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MAR 30 1970
DIVISION OF SANITARY ENGINEERING
ILLINOIS DEPT. OF PUBLIC HEALTH

March 26, 1970

Mr. Clarence W. Klassen
Illinois Sanitary Water Board
535 West Jefferson
Springfield, Illinois

Dear Mr. Klassen:

The SAVE Organization, which represents several thousand Northern Illinois Citizens, wish to submit herewith its recommendations for a number of water quality standards and recommendations to be put before the Reconvening Conference on March 31, at Milwaukee, on a Matter of Pollution of Lake Michigan and its Tributary Basins.

Some of these standards are within your present regulations. However, many represent more stringent controls than now exist, and some represent our view on new pollution problems that are, or about to be, interjected into the Lake Michigan water basin.

1. Since it has been estimated that it would take 95 years for Lake Michigan water to completely interchange, we request that NO discharge or waste of any type be allowed into Lake Michigan after the year 1972. It must be remembered that most water quality standards now in effect were designed with streams and rivers as a guide and do not take into account the rather stagnant characteristic of the water in the lake. If this regulation could be put into effect, it would supersede many of the lesser criteria that are to follow.

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Mr. Clarence W. Klassen
Illinois Sanitary Water Board

2. The State of Illinois now allows B.C.D. and suspended solids to be discharged into the Lake at a ratio of 40 to 50 parts per million. Why is this allowed when even a good secondary treatment plant would reduce this discharge to 15 parts per million, and a good tertiary system would reduce this to 4 parts per million. It seems to us ludicrous to allow such high discharge standards into the Lake when only 4 to 5 parts per million are allowed in the streams and rivers which are continually flushing themselves.

3. We strongly urge an immediate end to the Illinois Sanitary Water Board's standards which allow dilution of waste to meet their quality regulations. This really has the effect of negating all their affluent water standards with regards to Lake Michigan. As an example, Abbott Laboratories merely use large quantities of coolant water which they take from the lake; they then dilute what would otherwise be considered extreme pollution, and then return this pollution to the lake in diluted form to comply with your standards. Although, in their case, we are informed that even with this application of affluent dilution, they often fail to meet your standards. No other State, to our knowledge, allows dilution. (THE ANSWER TO POLLUTION IS NOT DILUTION.)

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4. We recommend that the State of Illinois and the three other States at this Conference adopt a policy of increasing dramatically the amount of money that is allowed to their State Boards whose duty it is to control pollution so that they can pay their engineers and personnel on a level with industry, and also so that they can routinely check present and potential polluters.

5. When pollution control agreements are reached between these agencies of the State and polluters - be they industries or municipalities - it is important that precise time schedules be set up for the remedy of the problem with intermediate check points as to the progress on the system which is to eliminate the particular pollution.

    a. Time for completion of preliminary engineering and drawings.

    b. Financing

    c. Final plans and specifications

    d. Commencing Construction

    e. Completion

It would be preferable if this schedule could be implemented in the form of a court-supervised consent decree.

To illustrate this point, it is very doubtful that the Metropolitan Sanitary District will meet its 1978 schedule with regard to its combined sewer system overflow into Lake Michigan after heavy rainstorms. This very necessary

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Mr. Clarence W. Klassen
Illinois Sanitary Water Board

5. (Continued)

storage system should be well underway by now if this date is to be met.

6. We ask that this Conference petition their respective State Legislators with regard to enacting a law forcing detergent manufacturers to reduce their phosphate and nitrate level a minimum of 25% per year. We understand this is within present technology and could even be done at a more rapid rate at some minimal reduction in the effectiveness of detergents.

7. Standards should be uniform throughout the State. We cannot understand why Lake County, Illinois, has weaker water standards than, say, Cook County. Why is there tertiary standard with regard to Lake Michigan on Cook County and not on Lake County? Often, industrial standards on the same waste problems are different than municipal standards.

8. Regulation with regard to the vast problem of combined sewer systems now in existence in the 4 States area must be enacted. While we realize that this is perhaps the most expensive of all of the problems confronting us with regard to water pollution, we feel it is rather useles to talk about cleaning up our water when one-third of all the bacteria and vires are injected into our water systems due to combined sewer overflow during rainstorms.

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Mr. Clarence W. Klassen
Illinois Sanitary Water Board

9. We believe the four states regulation requiring 80% phosphorus removal is very weak. Again, this is an open-end type regulation that really has relatively little meaning.

10. We urge that the percentage of dissolved solids that is allowed should be far less than the 80% regulation now in effect.

11. We strongly urge that the Clavey Road Sewage Treatment Plant Expansion be undertaken immediately and assurances be given local residents with regard to noxious odors. This is the vital key to the opening up of beaches in the Northern Portion of Illinois.

Lastly, we ask that more publicity and more direction be given to the eventual closing of all waste cycles including human waste. This waste should be processed and used in the agriculture industry and not sent into our water cycles.

Now, with regard to potential pollution from nuclear power stations, we wish you to consider thoroughly the following possible points:

1. Companies like Commonwealth Edison, should not use half truths to influence public opinions with the result that false conclusions will be arrived at. They have stated that the 9 nuclear power plants, built or planned in the Lake Michigan Basin, will only raise the temperature of the lake one-tenth of a degree. The real problem is not what is happening throughout the lake, but in the area of discharge. The water temperatures are

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Illinois Sanitary Water Board

1. (Continued)

to be raised, according to Commonwealth Edison, in the 10 to 15 degree sphere above the normal lake temperature in the area. The consequence of this temperature change is really unknown, and we can produce statements by scientists in this field of work that are quite contradictory. Many believe this will result in luxurient crop of filamentour algae "Clodophora". This algae is one of the important contributors to an early death of lakes. (Water Pollution Problem of Lake Michigan and Tributories, Federal Water Pollution Control Administration, January, 1968.)

2. Specifically, we believe that all coolant water used by power plants about the lake should return water to the lake at no more than 5 degrees above normal lake temperature. This, we are informed, can be accomplished by use of cooling towers even though this may add considerably to the cost of the plant. It is our understanding that Commonwealth Edison intends to return water to the lake with temperatures in the vicinity of 85 degrees in summer time. This is over 10 degrees higher than the lethal temperature of all of our Lake Michigan game fish.

3. We believe that there is no conclusive evidence that radio active tritum, which will be discharged though admittedly in non-toxic concentration, might not be re-concentrated by fish to a level that would be dangerous to man. We understand that Argonne Laboratories is to do some research with regard to this problem

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Mr. Clarence W. Klassen
Illinois Sanitary Water Board

3. (Continued)

this summer. The results of this study might be useful to determine whether the danger is real. Also, there is a great deal of concern by many scientists in the field that radiation levels are now too high.

4. The acids that clean the low level radio active waste from the resins in the ion exchanger should not, under any circumstances, be flushed into the lake.

And, in closing, we are wondering if the major power companies might not, through the use of cooling towers, insure against an unpredictable result that could not be ascertained for many years with regard to the lake. Though an extreme problem with regard to radio activity is admittedly fairly remote, I am sure the same type of conclusion with regard to oil spills might have been reached at the time the standards regulating them were arrived at.

Very truly yours,

Arthur Pancoe

Arthur Pancoe

AP:amh

MR. KLASSEN: And the last presentation, then, will be by Mr. Vaughn of the Chicago Department of Water. This is always, as far as I am concerned, one of the highlights of this conference, because the Chicago Water Department for many years has carried on very complete and extensive sampling surveillance, and it is a good barometer so far as our area of the lake of whether the lake is improving or is declining in the way of bacterial pollution and other pollution.

So our last presentation is by Mr. Vaughn of the Chicago Water Department.

JAMES C. VAUGHN
ENGINEER OF WATER PURIFICATION
DEPARTMENT OF WATER & SEWERS
CITY OF CHICAGO

MR. VAUGHN: If we may have the lights out and the first slide on.

I believe you all have copies of my report at the head table.

(Which said report is as follows:)

LAKE MICHIGAN WATER QUALITY AS RELATED TO CHICAGO'S WATER TREATMENT PLANTS

Presented at the FWPCA Four-State Conference on Pollution
of Lake Michigan and Its Tributary Basin

March 31, April 1, 1970

Presented for the Bureau of Water
Department of Water & Sewers

by

James C. Vaughn, Engineer of Water Purification

City of Chicago
Department of Water & Sewers

Richard J. Daley, Mayor

James W. Jardine, Commissioner

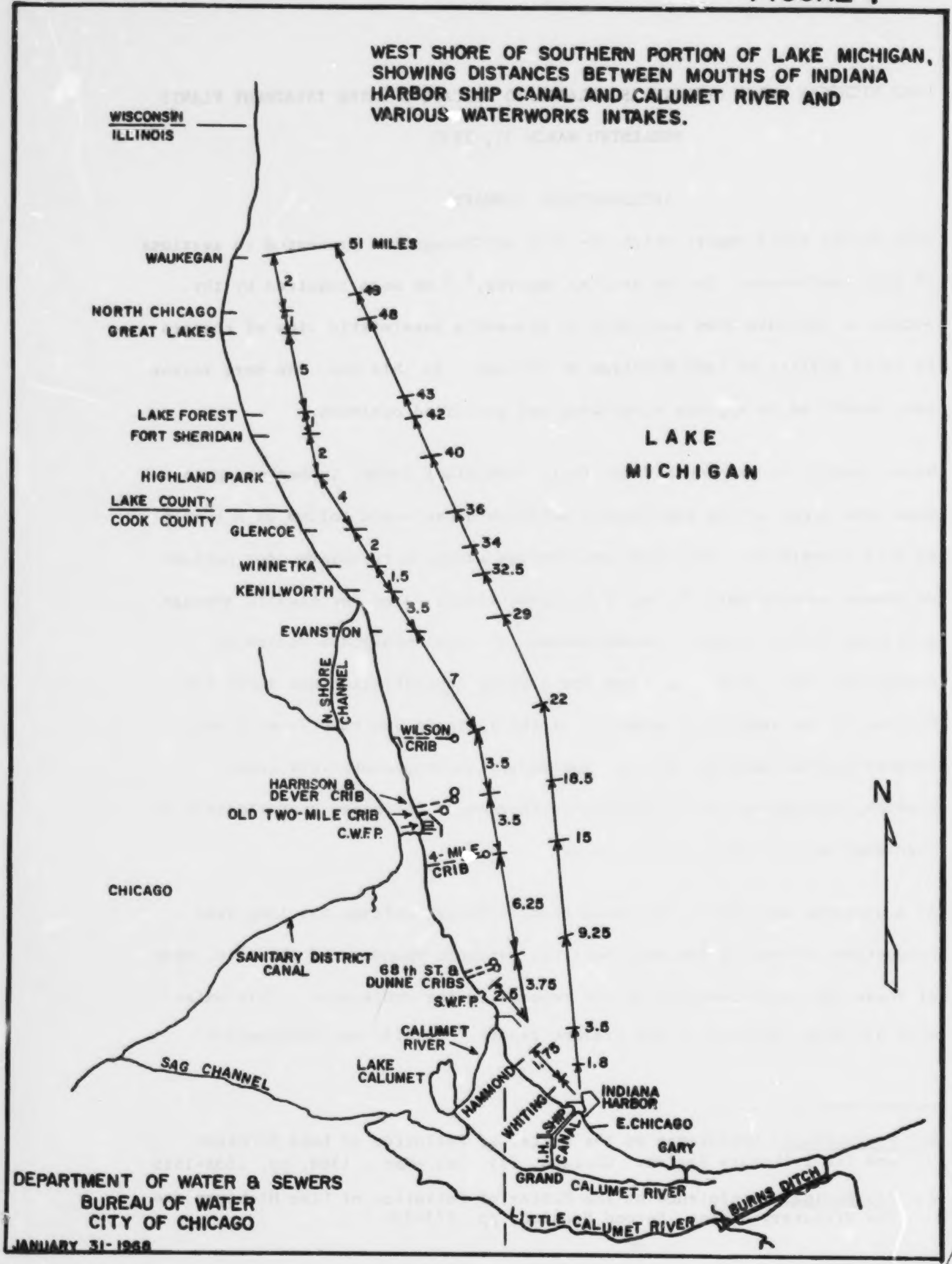
Raymond D. Johnsos
Deputy Commissioner for Water

Richard A. Pavia
Deputy Commissioner for Water & Sewers

ACKNOWLEDGEMENT

This report, as were all the previous reports submitted by the Chicago Department of Water and Sewers, is essentially a staff production of the Water Purification Division in the Bureau of Water. The laboratory staffs, the technical engineers, and the John R. Baylis Memorial Library (under the direction of Miss Barbara Fox) all participated in the gathering and compiling of data. The surveys were made by the Water Quality Surveillance Section headed by Mr. Jack W. Steiner who is responsible for the arrangement of the data in Figures 14, 15 and 16. The final arrangement of the data into the form presented in tables and charts, and much of the text, were done by Mr. Philip A. Reed, Filtration Engineer V, who acts as Technical Assistant to the Engineer of Water Purification. The reports themselves are products of the reproduction unit of the library.

FIGURE 1



WEST SHORE OF SOUTHERN PORTION OF LAKE MICHIGAN, SHOWING DISTANCES BETWEEN MOUTHS OF INDIANA HARBOR SHIP CANAL AND CALUMET RIVER AND VARIOUS WATERWORKS INTAKES.

WISCONSIN
ILLINOIS
WAUKEGAN
51 MILES
NORTH CHICAGO
GREAT LAKES
LAKE FOREST
FORT SHERIDAN
HIGHLAND PARK
LAKE COUNTY
COOK COUNTY
GLENCOE
WINNETKA
KENILWORTH
EVANSTON
N. SHORE CHANNEL
WILSON CRIB
HARRISON & DEVER CRIB
OLD TWO-MILE CRIB
C.W.F.P.
4-MILE CRIB
CHICAGO
SANITARY DISTRICT CANAL
68 th ST. & DUNNE CRIBS
S.W.F.P.
CALUMET RIVER
LAKE CALUMET
HAMMOND
WHITING
I.H. SHIP CANAL
INDIANA HARBOR
E. CHICAGO
GARY
GRAND CALUMET RIVER
LITTLE CALUMET RIVER
BURNS DITCH
SAG CHANNEL
LAKE MICHIGAN
N
2
1
5
1
2
4
2
1.5
3.5
7
3.5
3.5
6.25
3.75
2.5
1.75
49
48
43
42
40
36
34
32.5
29
22
18.5
15
9.25
3.5
1.8

DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

JANUARY 31-1966

LAKE MICHIGAN WATER QUALITY AS RELATED TO CHICAGO'S WATER TREATMENT PLANTS

PRESENTED MARCH 31, 1970

INTRODUCTION: SUMMARY

This is the third report which the City of Chicago has presented to sessions of this conference. In the earlier reports,[1] [2] we were required by the nature of the data then available to present a pessimistic view of changes in water quality of Lake Michigan at Chicago. In this one, the more recent data permit us to express a cautious and qualified optimism.

Water quality at the South Water Filtration Plant (SWFP) is beginning to show some signs of the improvement which we hoped would follow as a result of this conference. Frequency and average duration of severe odor periods decreased considerably during 1969, permitting a large decrease in average activated carbon dosage. Concentrations of total phosphate decreased during the same period, although the average concentration was above the maximum in the applicable standard of the Illinois Sanitary Water Board. Bacteriological quality at SWFP improved; plankton counts were lower. However, concentrations of refractory inorganics increased approximately as predicted on the basis of past data.

At a previous session it was noted that, although Chicago has long been conducting surveys of the area near the northern boundary of the city, none of these data were included in our reports to the conference. This omission has been repaired in the present report. Significant information has been added in Tables 10 and 11, and the most important parameters are shown in Figures 14, 15, and 16. Data included cover 1968 and 1969 to provide some basis for comparison. With the possible exception of total phosphate concentrations, nothing in these data suggests that water quality improved in the area covered by the surveys. They tend, rather, toward the opposite conclusion.

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[1] Proceedings, Conference on the Matter of Pollution of Lake Michigan and Its Tributary Basins. Chicago, Ill. Jan.-Mar., 1968. pp. 1538-1616

[2] Proceedings, Conference on the Matter of Pollution of Lake Michigan and Its Tributary Basins, Second Session, pp. 273-330

To avoid needless repetition, some of the other tables present data for 1968 and 1969 only. Persons interested in data for earlier years are referred to the reports already cited, and to a paper[3] by H. H. Gerstein in the Journal AWWA.

This current report incorporates a simpler system for numbering tables and figures than the one used earlier. Since it is believed that anyone seriously seeking information will not be seriously inconvenienced, no cross references are included. Otherwise, barring the additional data included, this report follows generally the form of the earlier ones.

DISCUSSION OF DATA

Bacterial Pollution

The average and maximum coliform bacteria per 100 ml at the SWFP intake (raw water header) for the year 1969 have been added to Table 1, plotted on the same sheet as Figure 2. It is noted that the average coliform 59.0 per 100 ml for 1969 is higher than the average for 1965, but not so high as the value of 260 per 100 ml for 1967 and 82 for 1968. The maximum value of 980 per 100 ml for 1969 is the lowest value recorded since 1954.

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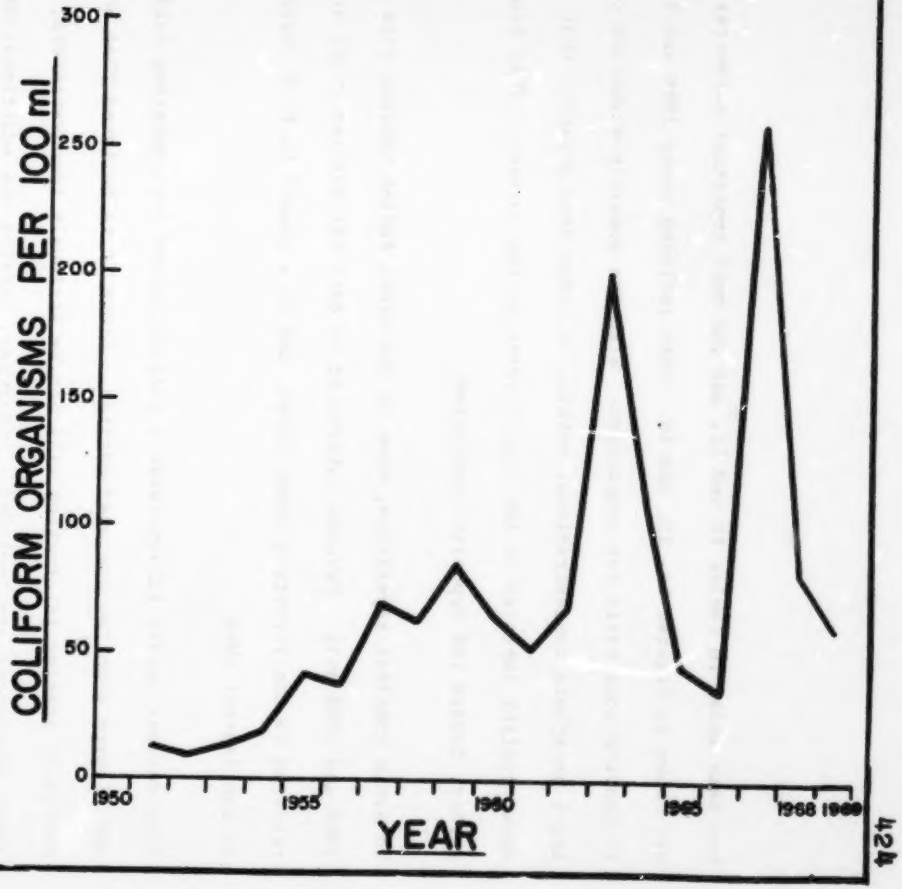
[3] Gerstein, H. H., Lake Michigan Pollution and Chicago's Supply. Jour. AWWA 57:841 (July, 1965)

AVERAGE COLIFORM PER 100 ml
SOUTH WATER FILTRATION PLANT INTAKE
1950 - 1969

YEAR	COLIFORM PER 100 ml	
	ANNUAL AVERAGE	MAXIMUM DAY
1950		
1951	14.0	375
1952	9.7	495
1953	13.9	534
1954	20.0	959
1955	42.3	1300
1956	38.7	1400
1957	70.8	9600
1958	63.1	6400
1959	85.6	3200
1960	65.2	2900
1961	52.4	3000
1962	69.5	1700
1963	200.8	5800
1964	110.2	1900
1965	46.3	1100
1966	35.8	1200
1967	260.0	13000
1968	82.0	2400
1969	59.0	980



DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

FIGURE 2

At the Central Water Filtration Plant (CWFP) the bacterial quality of the raw water showed a significant decline. Some abnormally high bacterial counts occurred. For example, on March 25, the confirmed coliform count on the raw water was 970/100 ml; April 19, 1300/100 ml; July 27, 910/100 ml; August 24, 4400/100 ml; and September 3, 916/100 ml. The 1969 average was 100/100 ml. These maximum values are out of all proportion to the annual value. This indicates periodic contamination from the discharge of inadequately treated sewage to the lake. One incident of another kind of poor quality water occurred in early spring. An organic material was found in the water which produced an objectionable taste and odor after several days in the distribution system. A sample of this waste water taken near the suspected discharge point had a chemical oxygen demand of 15.6 ppm as compared with a normal 4 to 6 ppm range.

Abnormal Pollution at SWFP Intakes

The data on abnormal hydrocarbon (oil refinery wastes) odor periods for the past 20 years were brought up to date through 1969 in Table 2 and are plotted on Figure 3. The number of odor periods (15) during 1969 is the lowest value since 1956. The number of odor days (42) is the lowest value since 1960. The maximum threshold odor reached during this period was 13 CH, the lowest maximum since 1950. The maximum activated carbon dosage applied (557 lb/mil gal) in 1969 exceeds the similar maximum value of 411 lb/mil gal for 1968 and equals the 557 lb/mil gal reached in 1967. The rise in this maximum value over the 1968 value indicates that the odor was more difficult to remove.

TABLE 2

SUMMARY OF "OIL REFINERY WASTE" TYPE ABNORMAL ODOR PERIODS IN RAW LAKE WATER SUPPLY TO SOUTH WATER FILTRATION PLANT 1950-1969

Year	Odor Periods	Total Odor Days	Maximum Threshold Odors During Periods 4-20	21-50	51-100	Maximum Activated Carbon Dosage Applied lb/mil gal
1950	10	36	6	3	1	1158
1951	20	127	16	4	-	446
1952	17	30	16	1	-	590
1953	16	18	16	-	-	266
1954	12	23	11	1	-	356
1955	15	36	15	-	-	279
1956	13	28	12	1	-	415
1957	18	49	18	-	-	325
1958	17	43	16	1	-	503
1959	19	40	17	2	-	712
1960	21	42	20	1	-	324
1961	23	94	23	-	-	388
1962	23	76	23	-	-	270
1963	28	72	27	1	-	680
1964	28	89	27	-	1	745
1965	15	46	14	1	-	320
1966	26	95	25	1	-	385
1967	21	89	20	1	-	557
1968	22	57	17	1	-	411
1969	15	42	13	1	-	557

Bureau of Water, Department of Water and Sewers, City of Chicago

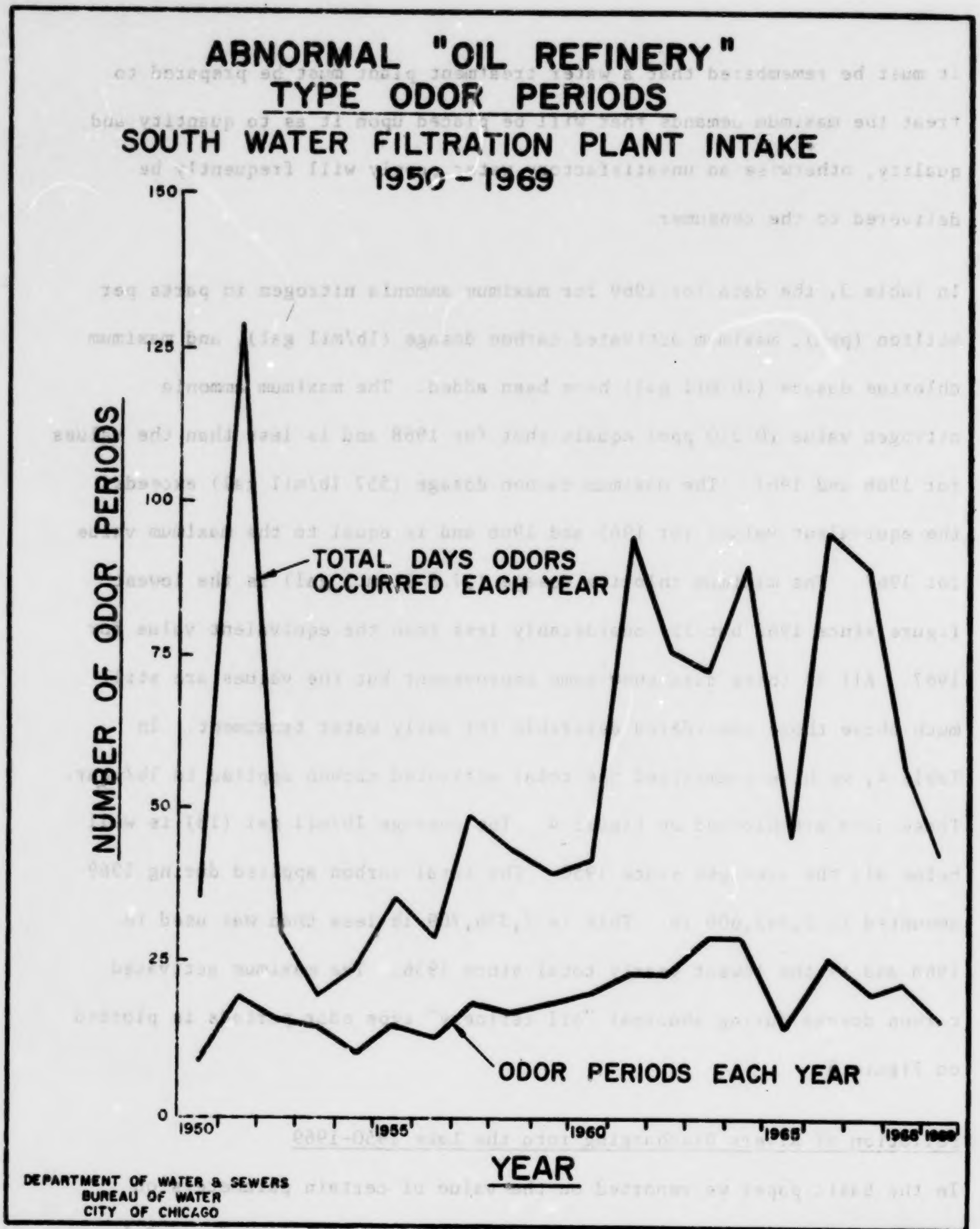

ABNORMAL "OIL REFINERY"
TYPE ODOR PERIODS
SOUTH WATER FILTRATION PLANT INTAKE
1950 - 1969
NUMBER OF ODOR PERIODS
150
125
100
75
50
25
0
TOTAL DAYS ODORS OCCURRED EACH YEAR
ODOR PERIODS EACH YEAR
1950
1955
1960
1965
1968
1969
YEAR
DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

FIGURE 3

It must be remembered that a water treatment plant must be prepared to treat the maximum demands that will be placed upon it as to quantity and quality, otherwise an unsatisfactory water supply will frequently be delivered to the consumer.

In Table 3, the data for 1969 for maximum ammonia nitrogen in parts per million (ppm), maximum activated carbon dosage (lb/mil gal), and maximum chlorine dosage (lb/mil gal) have been added. The maximum ammonia nitrogen value (0.250 ppm) equals that for 1968 and is less than the values for 1966 and 1967. The maximum carbon dosage (557 lb/mil gal) exceeds the equivalent values for 1965 and 1966 and is equal to the maximum value for 1967. The maximum chlorine dosage (37.8 lb/mil gal) is the lowest figure since 1962 but is considerably less than the equivalent value for 1967. All of these data show some improvement but the values are still much above those considered desirable for daily water treatment. In Table 4, we have summarized the total activated carbon applied in lb/year. These data are plotted on Figure 4. The average lb/mil gal (18) is well below all the averages since 1950. The total carbon applied during 1969 amounted to 2,542,600 lb This is 2,336,709 lb less than was used in 1968 and is the lowest yearly total since 1956. The maximum activated carbon dosage during abnormal "oil refinery" type odor periods is plotted on Figure 5.

Pollution of Rivers Discharging into the Lake 1950-1969

In the basic paper we reported on the value of certain parameters on samples taken from a number of points on the Calumet River, Grand Calumet River, Little Calumet River and the Indiana Harbor Ship Canal (IHSC). The

TABLE 3

SUMMARY OF MAXIMUM AMMONIA NITROGEN IN INTAKE WATER SUPPLY, AND ACTIVATED CARBON AND CHLORINE APPLIED DURING ABNORMAL ODOR POLLUTION PERIODS SOUTH WATER FILTRATION PLANT, 1950-1969

Year	Maximum Ammonia Nitrogen (ppm)	Maximum Activated Carbon Dosage (lb/mil gal)	Maximum Chlorine Dosage (lb/mil gal)
1950	0.276	1158	84.0
1951	0.196	446	45.5
1952	0.248	590	45.1
1953	0.120	266	35.4
1954	0.148	356	20.8
1955	0.125	279	24.3
1956	0.180	415	24.4
1957	0.248	325	26.8
1958	0.680	503	19.4
1959	0.290	712	24.5
1960	0.272	324	16.0
1961	0.358	388	20.3
1962	0.590	370	27.2
1963	0.230	680	42.8
1964	0.496	745	56.1
1965	0.198	320	53.1
1966	0.260	385	53.9
1967	0.260	557	70.0
1968	0.250	411	51.1
1969	0.250	557	37.8

Bureau of Water, Department of Water and Sewers, City of Chicago

TABLE 4

SUMMARY OF ACTIVATED CARBON APPLIED
FOR REMOVAL OF ODORS IN LAKE WATER
SOUTH WATER FILTRATION PLANT
1950-1969

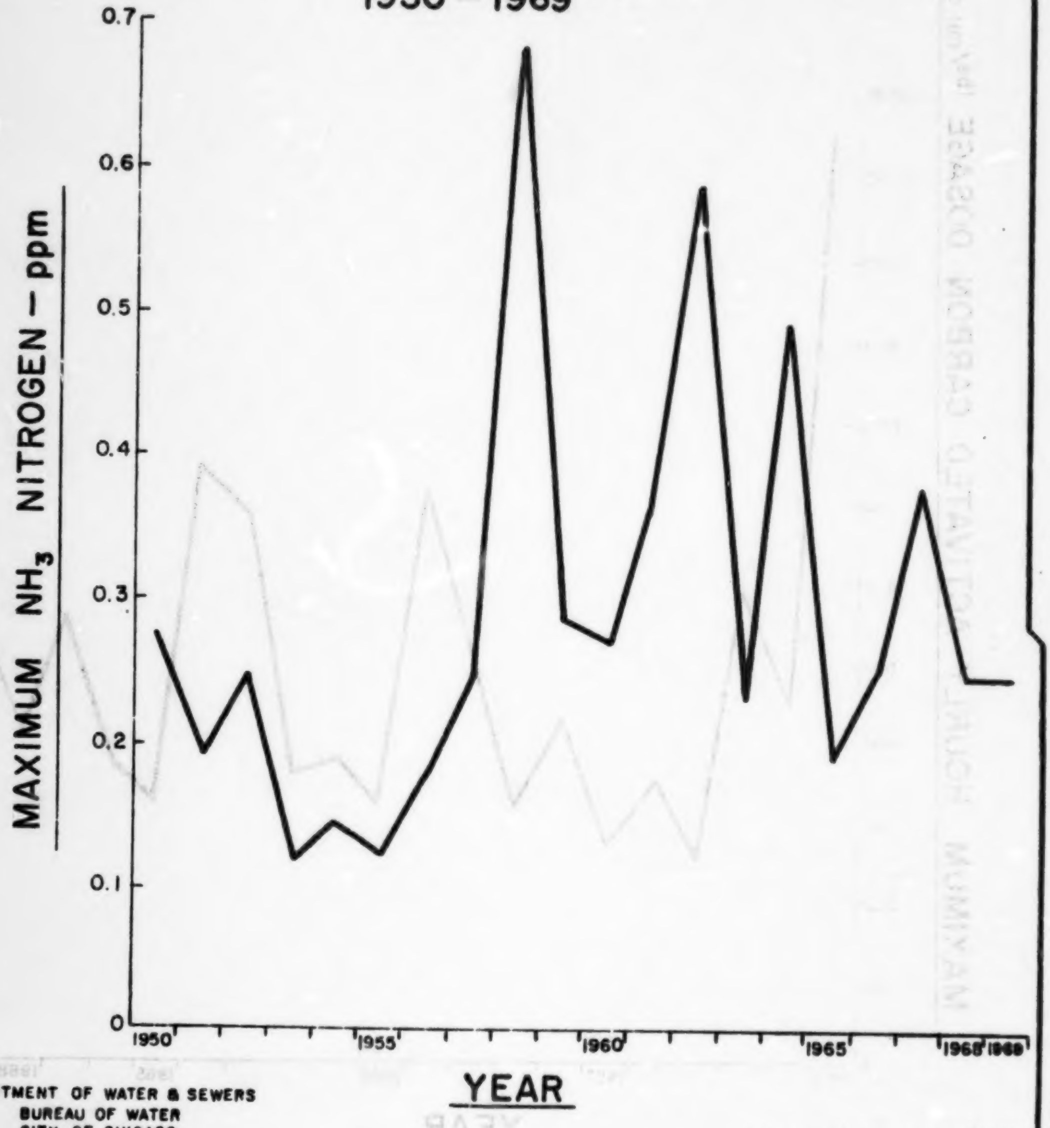
Year	Total Activated Carbon Applied (lbs)	Average Carbon Dosage (lb/mil gal)	Maximum Hourly Carbon Dosage during Odor Periods (lb/mil gal)
1950	2,874,905	26	1158
1951	3,545,552	31	446
1952	3,203,426	26	590
1953	1,775,063	14	266
1954	2,011,359	16	356
1955	2,057,781	17	279
1956	1,981,108	16	415
1957	3,032,729	24	325
1958	2,762,540	22	503
1959	3,033,509	23	712
1960	2,727,005	21	324
1961	2,632,923	21	388
1962	2,865,541	22	370
1963	3,194,443	23	680
1964	3,773,655	27	745
1965	3,094,606	23	320
1966	4,678,661	33	385
1967	4,455,273	32	557
1968	4,879,309	33	411
1969	2,542,600	18	557

Bureau of Water, Department of Water and Sewers, City of Chicago

FIGURE 4

MAXIMUM AMMONIA NITROGEN DURING ABNORMAL "OIL REFINERY" TYPE ODOR PERIODS

SOUTH WATER FILTRATION PLANT INTAKE
1950 - 1969



DEPARTMENT OF WATER & SEWERS
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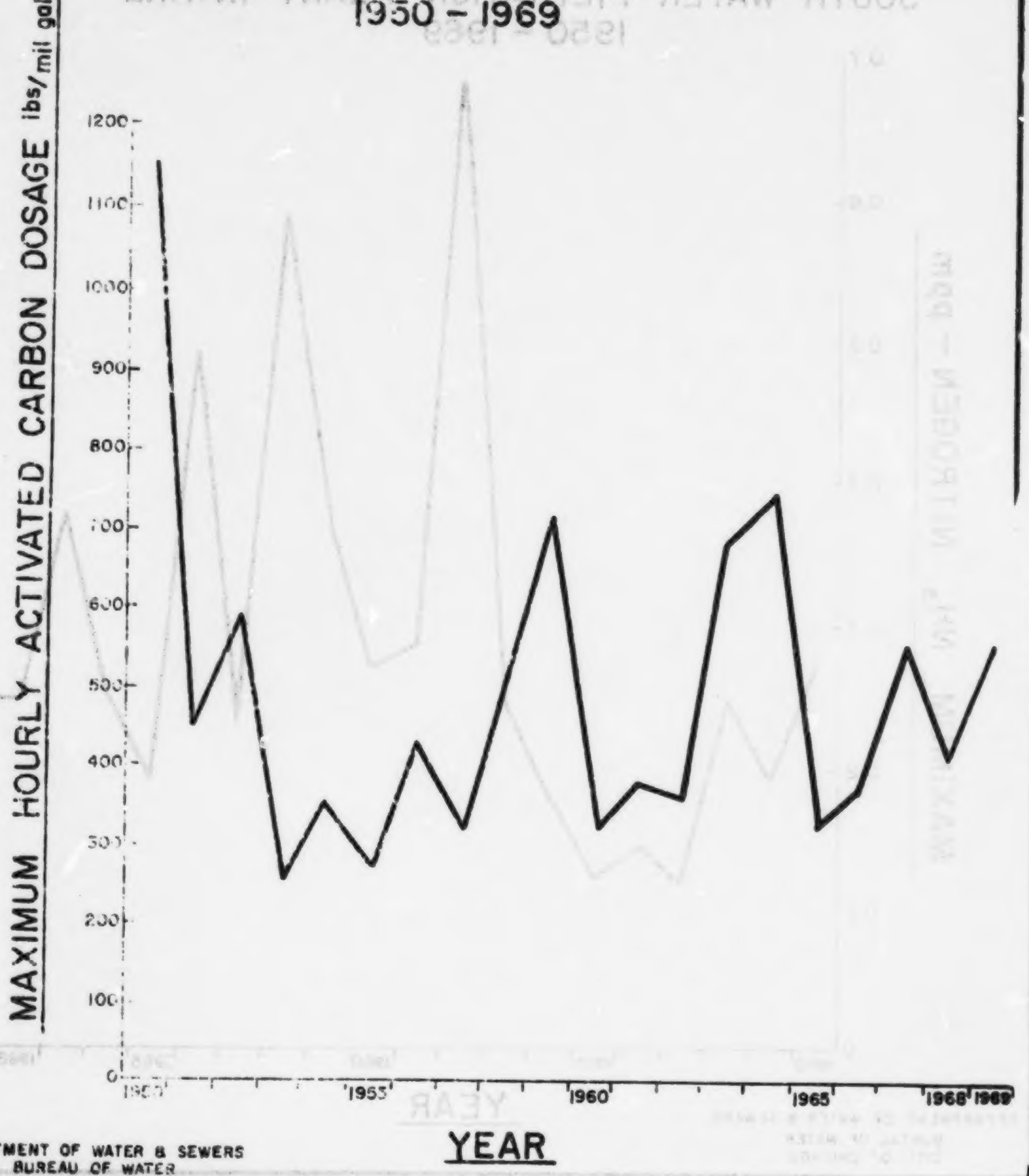
CITY OF CHICAGO

FIGURE 5

MAXIMUM ACTIVATED CARBON DOSAGE DURING ABNORMAL "OIL REFINERY" TYPE ODOR PERIODS

SOUTH WATER FILTRATION PLANT INTAKE
1950 – 1969



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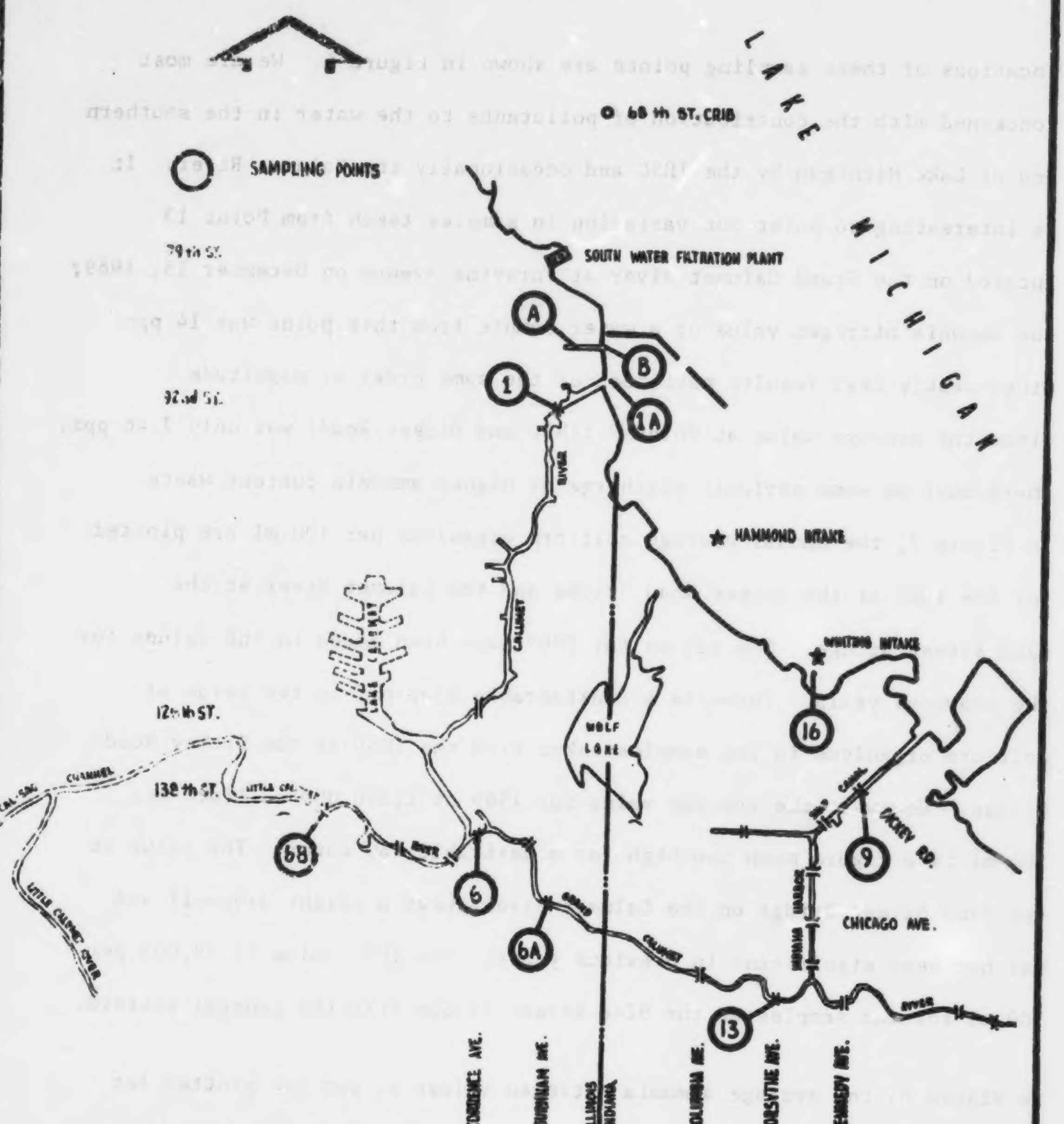
locations of these sampling points are shown in Figure 6. We are most concerned with the contribution of pollutants to the water in the southern end of Lake Michigan by the IHSC and occasionally the Calumet River. It is interesting to point out variation in samples taken from Point 13 located on the Grand Calumet River at Forsythe Avenue on December 15, 1969; the ammonia nitrogen value of a water sample from this point was 14 ppm. Other weekly test results have been of the same order of magnitude. Since the average value at Point 9 (IHSC and Dickey Road) was only 7.46 ppm, there must be some periodic discharge of higher ammonia content waste. In Figure 7, the annual average coliform organisms per 100 ml are plotted for the IHSC at the Dickey Road Bridge and the Calumet River at the 92nd Street Bridge. The values for 1969 have been added to the values for the previous years. There is a considerable drop-off in the value of coliform organisms in the samples taken from the IHSC at the Dickey Road Bridge. However, the average value for 1969 of 1,350,000 coliform per 100 ml is a figure much too high for a desirable raw water. The value at the 92nd Street Bridge on the Calumet River shows a slight drop-off and has not been significant in previous years. The 1969 value of 59,000 per 100 ml for the samples at the 92nd Street Bridge fits the general pattern.

In Figure 8, the average ammonia nitrogen values in ppm are plotted for the two points under discussion. Surprisingly, the average value of 7.46 ppm ammonia nitrogen for the samples taken at the Dickey Road Bridge for the 1969 period is far in excess of any previously recorded value. We have no explanation for this increase in ammonia nitrogen value. It might be deduced that the efficacy of treatment of sewage plant effluents being contributed to the Ship Canal is not as high as could be

WEEKLY POLLUTION SURVEYS - LOCATION OF SAMPLING POINTS


LAKE MICHIGAN
68th ST. CRIB
SAMPLING POINTS
79th ST.
SOUTH WATER FILTRATION PLANT
A
B
1
1A
92nd ST.
HAMMOND INTAKE
WHITING INTAKE
16
WOLF LAKE
127th ST.
CAL-SAG CHANNEL
138th ST.
LITTLE CALUMET RIVER
6B
6
6A
GRAND CALUMET
9
INDIANA HARBOR
CHICAGO AVE.
13
RIVER
LITTLE CALUMET RIVER
TORRENCE AVE.
BURNHAM AVE.
ILLINOIS
INDIANA
COLUMBIA AVE.
FORSYTHE AVE.
KENNEDY AVE.

CITY OF CHICAGO

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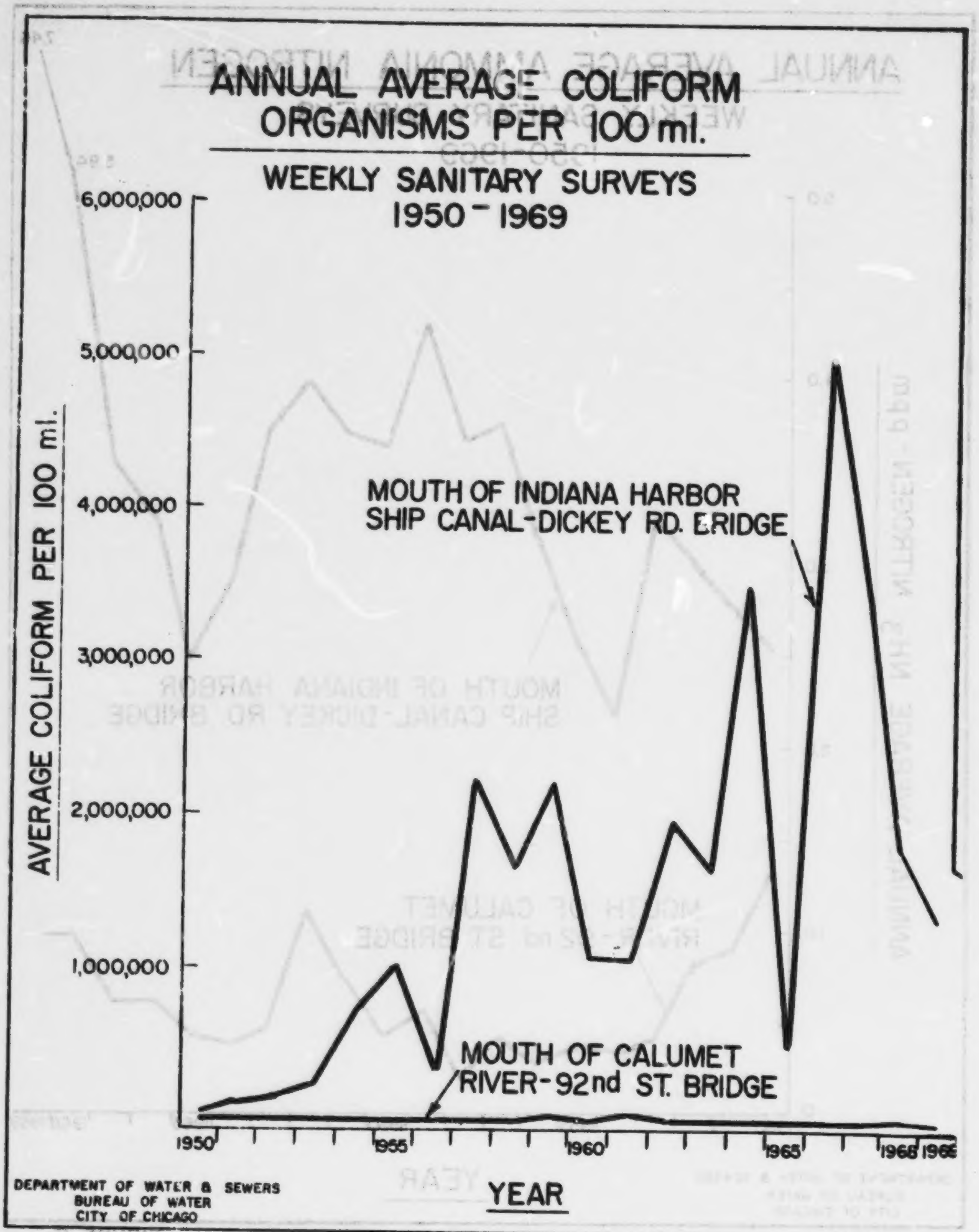
FIGURE 6

JUNE 1969 D.P.


ANNUAL AVERAGE COLIFORM ORGANISMS PER 100 ml.
WEEKLY SANITARY SURVEYS 1950 - 1969
AVERAGE COLIFORM PER 100 ml.
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
MOUTH OF INDIANA HARBOR SHIP CANAL-DICKEY RD. BRIDGE
MOUTH OF CALUMET RIVER-92nd ST. BRIDGE
1950
1955
1960
1965
1968
1969
YEAR
DEPARTMENT OF WATER & SEWERS
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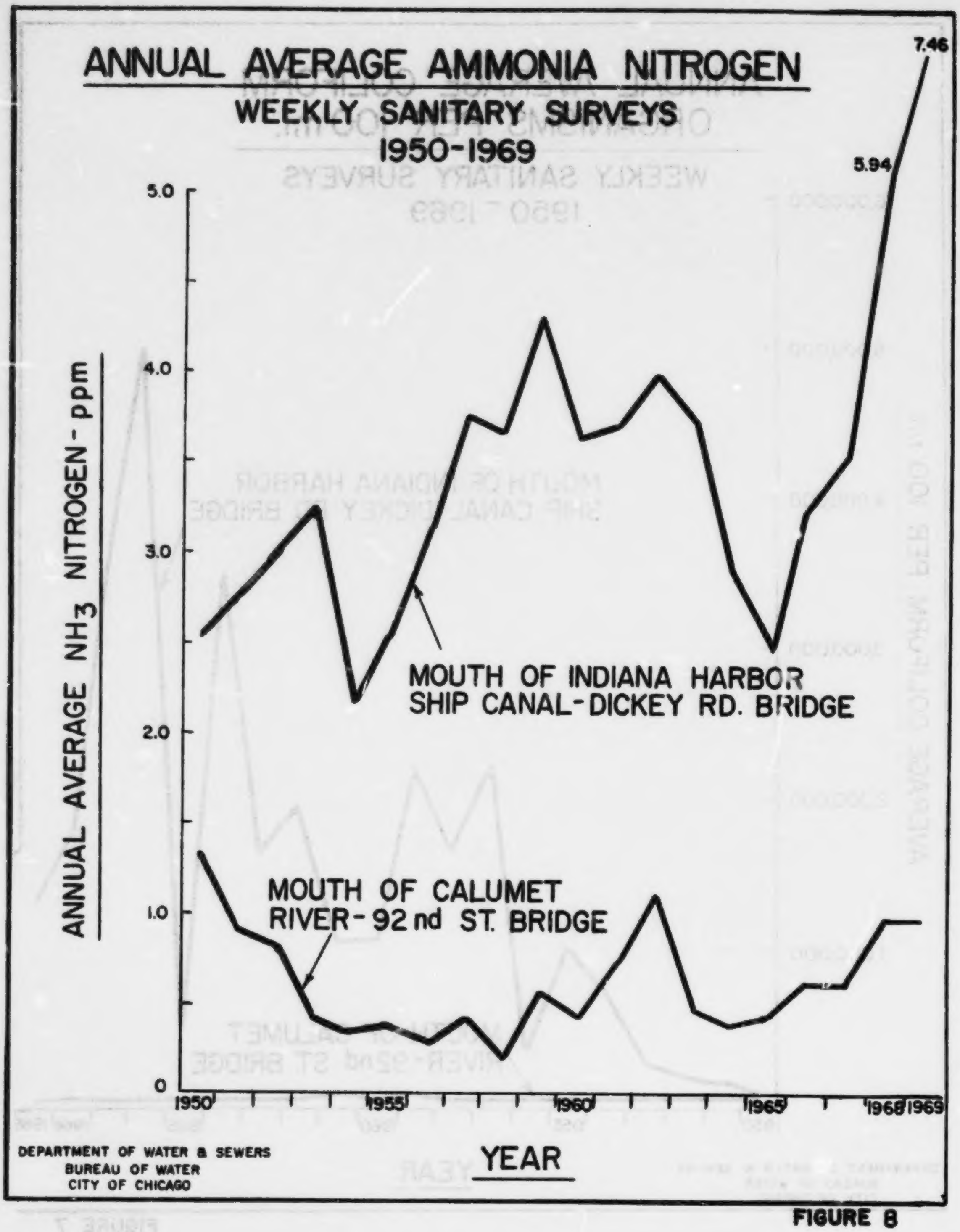
CITY OF CHICAGO

FIGURE 7



ANNUAL AVERAGE AMMONIA NITROGEN
WEEKLY SANITARY SURVEYS
1950-1969

DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

FIGURE 8

desired or even expected. There has been a slight decrease in the ammonia nitrogen value of the samples taken at the 92nd Street Bridge of the Calumet River. The 1968 average value was 0.99 ppm and the 1969 value is 0.94 ppm.

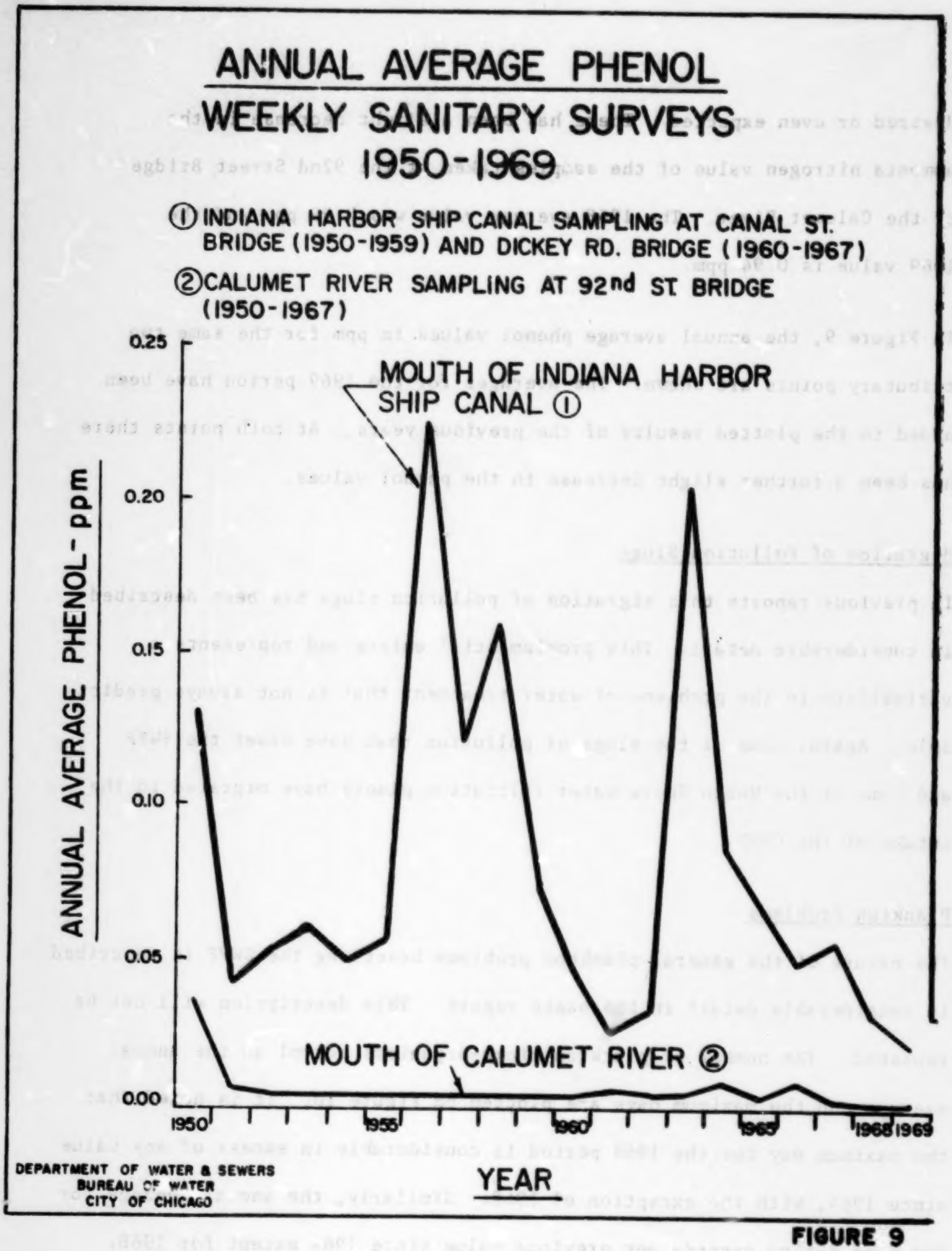
In Figure 9, the annual average phenol values in ppm for the same two tributary points are shown. The averages for the 1969 period have been added to the plotted results of the previous years. At both points there has been a further slight decrease in the phenol values.

Migration of Pollution Slugs

In previous reports this migration of pollution slugs has been described in considerable detail. This problem still exists and represents a variability in the problems of water treatment that is not always predictable. Again, some of the slugs of pollution that have beset the SWFP and some of the North Shore water filtration plants have migrated to the intake of the CWFP.

Plankton Problems

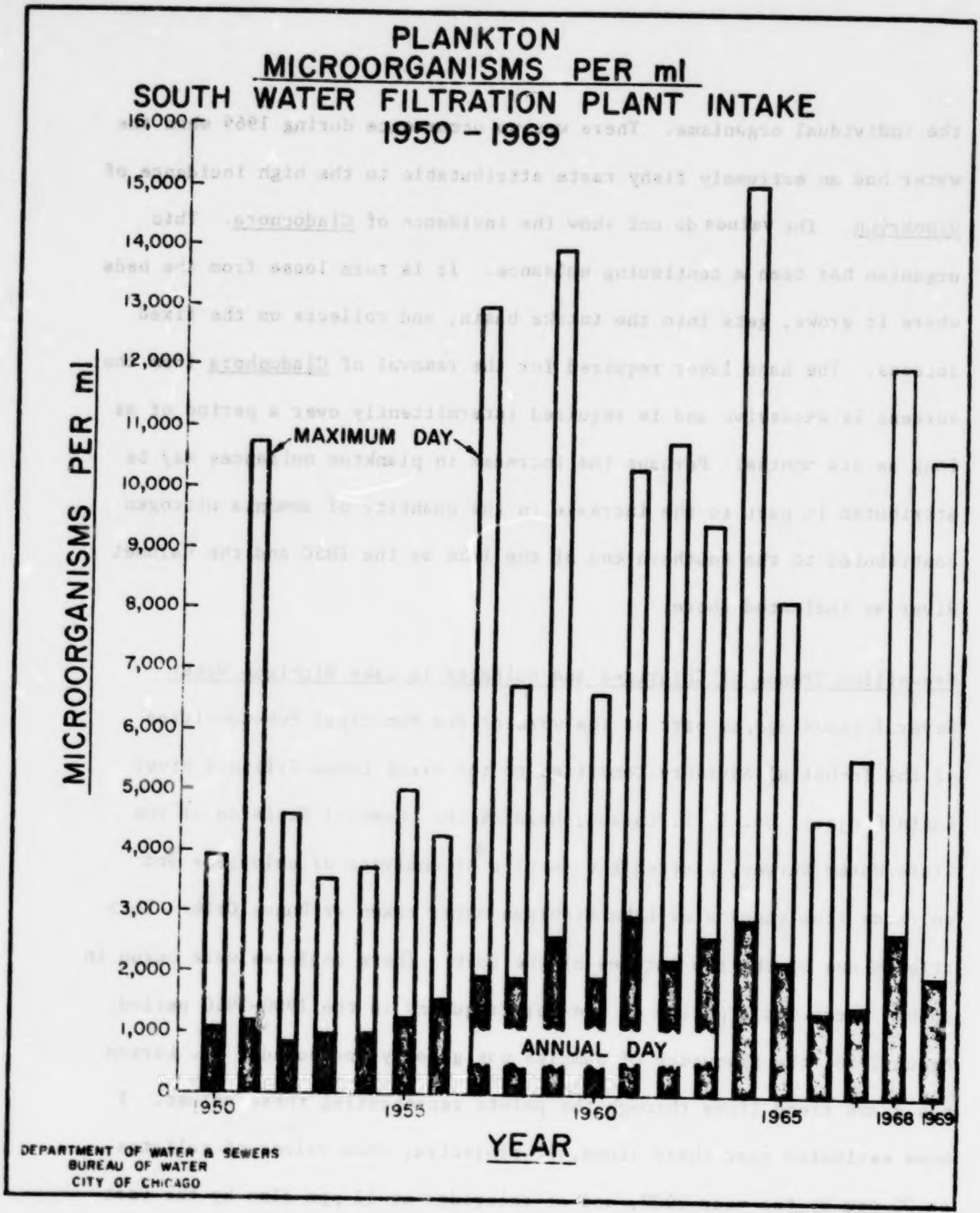
The nature of the general plankton problems besetting the SWFP is described in considerable detail in the basic report. This description will not be repeated. The number of plankton micro-organisms per ml as the annual average and the maximum days are plotted on Figure 10. It is noted that the maximum day for the 1969 period is considerably in excess of any value since 1964, with the exception of 1968. Similarly, the annual average for the same period exceeds any previous value since 1964 except for 1968. The 1969 average value is 2000 per ml and the maximum value is 10,500 per ml. It is pointed out that these values do not indicate the breakdown count of



ANNUAL AVERAGE PHENOL
WEEKLY SANITARY SURVEYS
1950-1969

DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

FIGURE 9



PLANKTON
MICROORGANISMS PER ml
SOUTH WATER FILTRATION PLANT INTAKE
1950 - 1969

DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

FIGURE 10

the individual organisms. There was no occurrence during 1969 when the water had an extremely fishy taste attributable to the high incidence of Dinobryon. The values do not show the incidence of Cladophora. This organism has been a continuing nuisance. It is torn loose from the beds where it grows, gets into the intake basin, and collects on the fixed screens. The hand labor required for the removal of Cladophora from the screens is excessive and is required intermittently over a period of as long as six months. Perhaps the increase in plankton nuisances may be attributed in part to the increase in the quantity of ammonia nitrogen contributed to the southern end of the lake by the IHSC and the Calumet River as indicated above.

Prevailing Trends of Chlorides and Sulfates in Lake Michigan Water

Several years ago, as part of the work of the Municipal Sub-Committee of the Technical Advisory Committee to the Great Lakes-Illinois River Basin Project, Dr. T. E. Larson, head of the Chemical Division of the State Water Survey, plotted the results of analyses of chlorides and sulfates from samples of Lake Michigan water taken at Dunne Crib. This crib is one of the two intakes of the SWFP. These analyses were begun in 1860. There was a period of greater frequency in the 1900-1910 period. About 1926, the frequency of samples was greatly increased. Dr. Larson has drawn trend lines through the points representing these values. I have estimated that these lines, if projected, show values of sulfates at 30 ppm by the year 2000, and of chlorides at 12 ppm also by the year 2000. The plotting of these data may be seen in Figure 11.

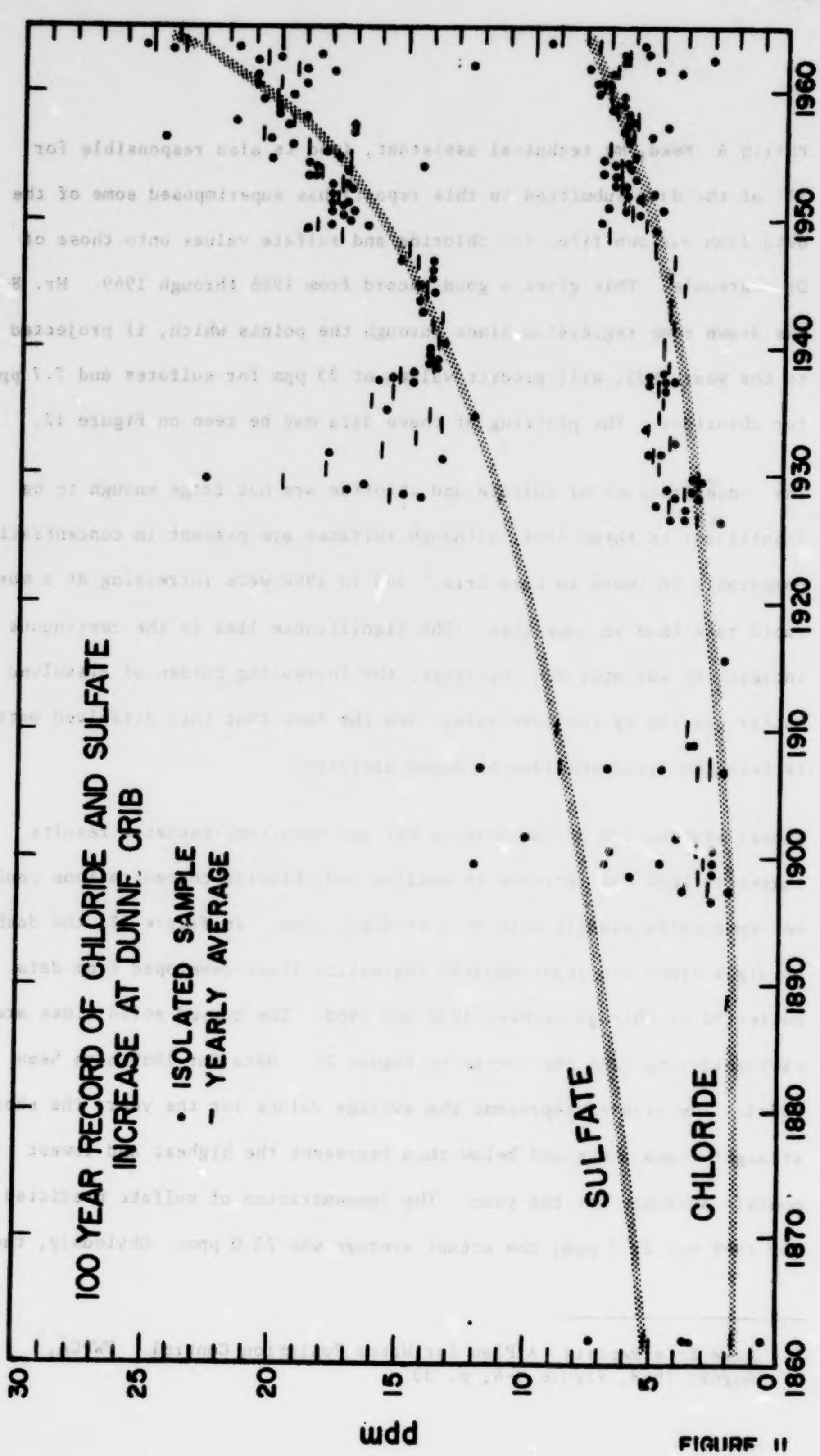

100 YEAR RECORD OF CHLORIDE AND SULFATE
INCREASE AT DUNNE CRIB
• ISOLATED SAMPLE
– YEARLY AVERAGE
SULFATE
CHLORIDE
ppm
0
5
10
15
20
25
30
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960

FIGURE 11

Philip A. Reed, my technical assistant, (who is also responsible for all of the data submitted in this report) has superimposed some of the data from our own files for chloride and sulfate values onto those of Dr. Larson's. This gives a good record from 1926 through 1969. Mr. Reed has drawn some regression lines through the points which, if projected to the year 1975, will predict values of 23 ppm for sulfates and 7.7 ppm for chlorides. The plotting of these data may be seen on Figure 12.

The concentrations of sulfate and chloride are not large enough to be significant in themselves, although sulfates are present in concentrations comparable to those in Lake Erie,[4] and in 1960 were increasing at a more rapid rate than in Lake Erie. The significance lies in the continuous increase of sulfates and chlorides, the increasing burden of dissolved matter carried by the lake water, and the fact that this dissolved matter is being put into the lake by human activity.

Closer examination of the more recent and more comprehensive results suggested that the increase in sulfate and chloride concentrations could be represented equally well by a straight line. In Figure 12, the dashed straight lines are least-squares regression lines developed from data collected at Chicago between 1926 and 1968. The curved solid lines are extrapolations from the curves in Figure 11. Data for 1969 have been added. The crosses represent the average values for the year; the short straight lines above and below them represent the highest and lowest monthly averages for the year. The concentration of sulfate predicted for 1969 was 21.7 ppm; the actual average was 23.0 ppm. Obviously, the

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[4] Lake Erie Report: A Plan for Water Pollution Control. FWPCA, August 1968, Figure 3-4, p. 33.

45 YEAR RECORD OF CHLORIDE AND SULFATE INCREASE AT DUNNE CRIB

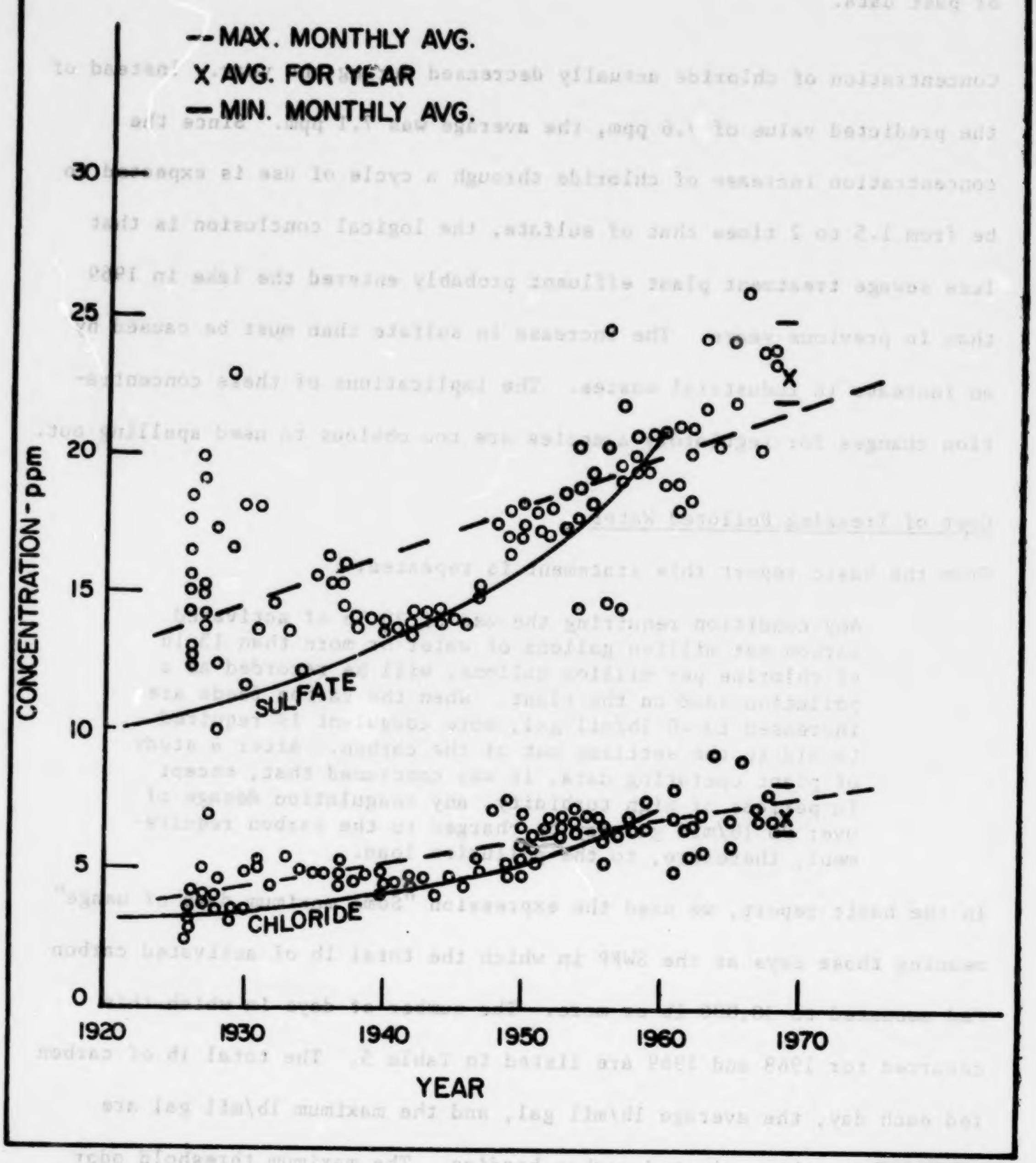

FIGURE 12

sulfate concentration rose much more rapidly than expected on the basis of past data.

Concentration of chloride actually decreased during the year. Instead of the predicted value of 7.6 ppm, the average was 7.1 ppm. Since the concentration increase of chloride through a cycle of use is expected to be from 1.5 to 2 times that of sulfate, the logical conclusion is that less sewage treatment plant effluent probably entered the lake in 1969 than in previous years. The increase in sulfate then must be caused by an increase in industrial wastes. The implications of these concentration changes for regulatory agencies are too obvious to need spelling out.

Cost of Treating Polluted Water

From the basic report this statement is repeated:

> Any condition requiring the use of 20 lb of activated carbon per million gallons of water or more than 13 lb of chlorine per million gallons, will be recorded as a pollution load on the plant. When the carbon feeds are increased to 40 lb/mil gal, more coagulant is required to aid in the settling out of the carbon. After a study of plant operating data, it was concluded that, except in periods of high turbidity, any coagulation dosage of over 90 lb/mil gal may be charged to the carbon requirement, therefore, to the pollution load.

In the basic report, we used the expression "Some maximum days of usage" meaning those days at the SWFP in which the total lb of activated carbon fed amounted to 30,000 lb or more. The number of days in which this occurred for 1968 and 1969 are listed in Table 5. The total lb of carbon fed each day, the average lb/mil gal, and the maximum lb/mil gal are listed under the activated carbon heading. The maximum threshold odor hours for each of these days is listed under that heading and the maximum ammonia nitrogen hours are likewise listed under their heading. The

TABLE 5

SOME MAXIMUM DAYS OF USAGE
1968-1969

Yr., Mo., and Day	Activated Carbon Total #	Activated Carbon Avg. #/MG	Activated Carbon Max. #/MG	Threshold Odors Maximum Hour	Ammonia Nitrogen Max. Hr. (ppm)
1968					
Jan. 18	45,876	121	240	14 Ch	0.068
Jan. 19	50,698	133	411	14 Ch	0.062
Jan. 20	35,652	97	140	6 Ch	0.042
Jan. 21	35,051	100	158	6 Ch	0.024
Jan. 26	34,088	91	204	5 Ch	0.034
Jan. 27	40,080	113	145	6 Ch	0.054
Jan. 28	42,833	123	129	7 Ch	0.060
Feb. 1	59,404	160	203	10 Ch	0.160
Feb. 2	40,367	107	134	5 Ch	0.072
Mar. 16	36,971	102	146	6 Ch	0.04
Mar. 17	32,133	95	239	6 Ch	0.06
Mar. 18	31,139	80	134	6 Ch	0.08
Mar. 19	92,836	246	353	25 Ch	0.25
Mar. 20	61,690	159	338	7 Ch	0.13
Mar. 21	42,755	112	222	7 Ch	0.12
Mar. 29	30,529	81	164	7 Ch	0.06
Mar. 30	39,284	104	162	7 Ch	0.07
Apr. 4	47,894	132	209	12 Ch	0.14
Apr. 7	34,053	110	175	7 Ch	0.12
Apr. 13	34,105	96	221	10 Ch	0.12
Apr. 17	56,283	153	290	10 Ch	0.12
Apr. 19	33,104	85	147	5 Ch	0.10
Apr. 21	30,697	89	195	4 Ch	0.07
Apr. 24	46,678	126	160	6 Ch	0.07
June 6	30,598	58	68	5 DF	0.01
June 7	33,161	54	63	5 DF	0.02
June 8	33,632	58	65	5 DF	0.01
June 9	35,473	65	72	5 DF	0.02
June 10	34,910	61	72	5 Ds	0.06
June 11	39,136	71	86	5 Ds	0.03
June 12	50,959	103	144	8 SF	0.03
June 13	51,117	107	133	5 G	0.03
June 14	40,106	77	119	5 Ds	0.03
June 21	45,285	97	115	5 Ch	0.06
June 23	46,667	111	222	10 Ch	0.05
Sept. 20	37,595	89	105	4 Ch	0.05
Oct. 9	32,479	81	143	6 Ch	0.05
Nov. 1	39,478	108	161	6 Ch	0.14
Dec. 11	70,587	201	370	20 Ch	0.12

TABLE 5

SOME MAXIMUM DAYS OF USAGE
1968-1969

Yr.,Mo., and Day	Activated Carbon Total #	Activated Carbon Avg. #/MG	Activated Carbon Max. #/MG	Threshold Odors Maximum Hour	Ammonia Nitrogen Max. Hr. (ppm)
1969					
Jan. 16	30,765	74	422	18 Ch	0.17
Jan. 21	40,649	109	169	12 Ch	0.18
Jan. 22	44,337	123	159	10 Ch	0.14
Jan. 23	87,396	244	557	20 Ch	0.25
Jan. 24	43,957	122	296	10 Ch	0.22
Jan. 25	31,062	87	231	10 Ch	0.16
Dec. 10	33,000	95	159	10 Ch	0.13
Dec. 26	53,100	160	250	10 Ch	0.16
Dec. 27	43,700	131	284	10 Ch	0.12
Dec. 29	33,000	97	136	8 Ch	0.16

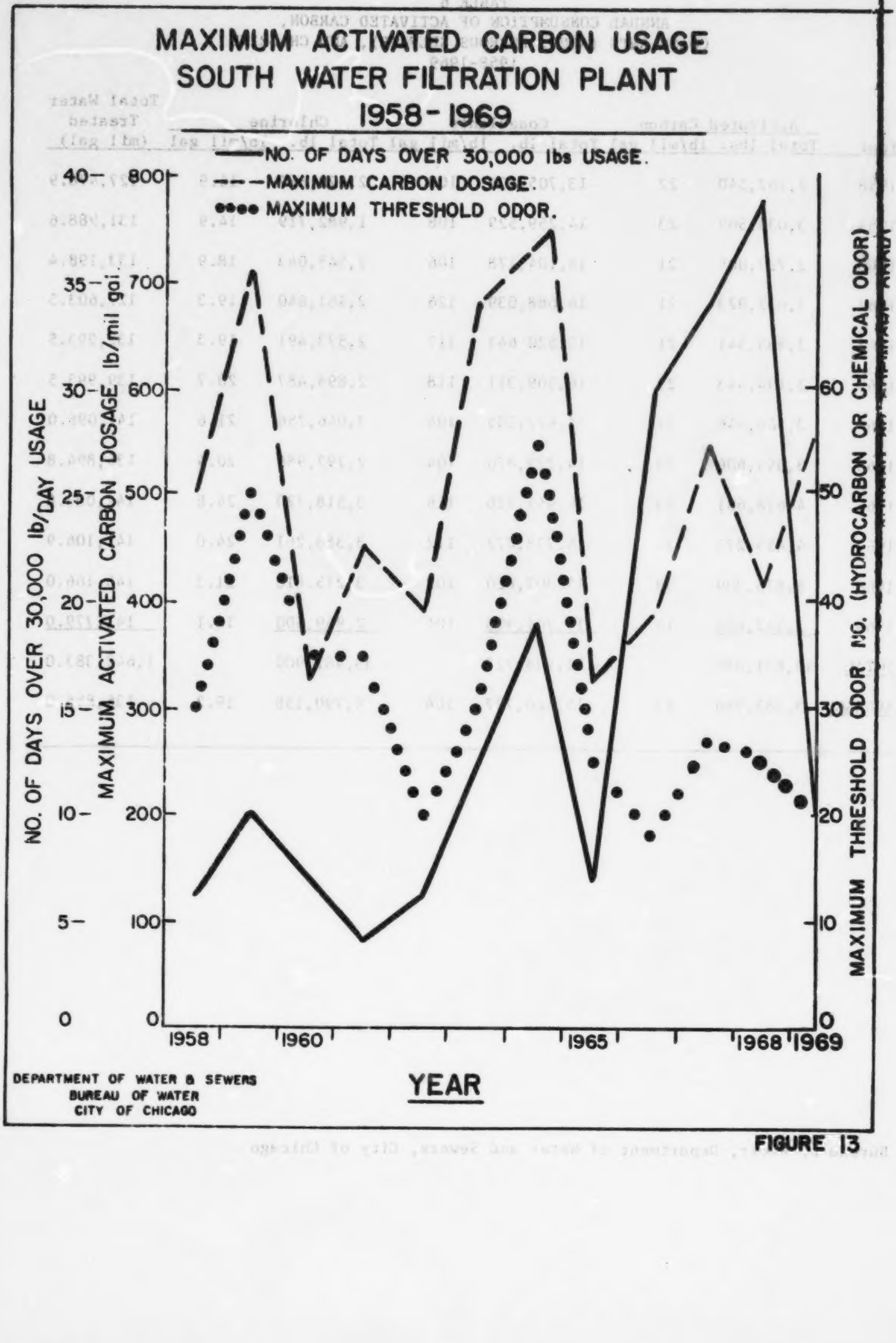
MAXIMUM ACTIVATED CARBON USAGE
SOUTH WATER FILTRATION PLANT
1958-1969
NO. OF DAYS OVER 30,000 lbs USAGE.
MAXIMUM CARBON DOSAGE.
MAXIMUM THRESHOLD ODOR.
NO. OF DAYS OVER 30,000 lb/DAY USAGE
MAXIMUM ACTIVATED CARBON DOSAGE lb/mil gal
MAXIMUM THRESHOLD ODOR NO. (HYDROCARBON OR CHEMICAL ODOR)
0
5
10
15
20
25
30
35
40
0
100
200
300
400
500
600
700
800
0
10
20
30
40
50
60
1958
1960
1965
1968
1969
YEAR
DEPARTMENT OF WATER & SEWERS
BUREAU OF WATER
CITY OF CHICAGO

FIGURE 13

TABLE 6
ANNUAL CONSUMPTION OF ACTIVATED CARBON, COAGULANTS (ALUM, FERROUS SULFATE), AND CHLORINE
1958-1969

	Activated Carbon		Coagulants		Chlorine		Total Water Treated
Year	Total lbs.	lb/mil gal	Total lb.	lb/mil gal	Total lb.	lb/mil gal	(mil gal)
1958	2,762,540	22	13,705,336	108	2,172,687	16.9	127,478.9
1959	3,035,509	23	14,259,529	108	1,982,719	14.9	131,988.6
1960	2,727,005	21	14,104,178	106	2,545,043	18.9	133,198.4
1961	2,632,923	21	16,088,039	126	2,461,640	19.3	127,603.5
1962	2,865,541	21	15,520,647	117	2,573,491	19.3	132,993.5
1963	3,194,443	23	16,509,311	118	2,898,487	20.7	139,993.5
1964	3,766,446	27	14,627,505	104	3,046,756	21.6	141,096.0
1965	3,094,606	23	14,279,870	104	2,797,986	20.4	136,894.8
1966	4,678,661	33	16,445,820	116	3,518,720	24.8	142,083.8
1967	4,455,273	32	15,778,872	112	3,388,261	24.0	141,106.9
1968	4,876,309	33	15,907,820	109	3,215,810	21.3	146,166.0
1969	2,542,600	18	14,701,900	104	2,969,600	16.1	141,779.0
TOTAL	40,631,856		181,928,727		33,481,900		1,642,383.0
AVERAGE	3,385,988	23	15,160,727	104	2,790,158	19.2	136,865.0

Bureau of Water, Department of Water and Sewers, City of Chicago

TABLE 7

SUMMARY OF COSTS: ACTIVATED CARBON, COAGULANTS (ALUM, FERROUS SULFATE) AND CHLORINE
1958-1969

	Activated Carbon		Coagulants		Chlorine	
Year	Total	$/mil gal	Total	$/mil gal	Total	$/mil gal
1958	$ 215,723.57	$ 1.69	$ 231,346.94	$ 1.81	$ 105,098.08	$ 0.82
1959	237,432.07	1.80	253,823.36	1.92	96,308.97	0.73
1960	213,435.65	1.60	329,818.94	1.80	121,546.69	0.91
1961	206,742.88	1.62	281,796.83	2.21	117,688.60	0.92
1962	230,698.90	1.74	274,973.31	2.07	120,121.66	0.90
1963	253,981.84	1.82	304,475.38	2.17	129,379.43	0.93
1964	296,684.97	2.10	272,187.75	1.93	140,934.75	1.00
1965	243.055.45	1.78	268,806.52	1.96	122,776.01	0.90
1966	361,222.18	2.54	303,788.28	2.14	162,470.73	1.14
1967	368,913.81	2.61	293,547.31	2.08	167,047.76	1.18
1968	415,789.00	2.86	304,206.00	2.07	146,122.00	1.00
1969	224,134.00	1.58	263,900.00	1.86	143,098.00	1.01
TOTAL	$3,267,784.00		$3,403,333.00		$1,572,593.00	
AVERAGE	$ 272,315.00	$ 1.88	$ 283,611.00	$ 1.95	$ 131,049.00	$ 0.90

TABLE 8

CONTRACT PRICES PER TON CENTRAL AND SOUTH FILTRATION PLANTS
1958-1969

	Chemical		
Year	Alum (Liquid)	Carbon	Chlorine
1958	$39.07	$156.18	$96.74
1959	40.84	156.44	97.15
1960	40.86	156.53	95.54
1961	40.96	157.04	95.62
1962	41.35	161.01	92.94
1963	40.79	159.01	89.27
1964	41.30	157.24	92.24
1965	39.95	156.70	83.20
1966	40.55	156.70	95.20
1967	41.85	166.60	97.20
1968	43.45	178.00	93.40
1969	43.75	173.00	95.40

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number of maximum usage days in the 1968 period is 39 which is somewhat higher than the equivalent value for previous years. The increase is confirmed by the total carbon usage for 1968 which is in excess of the usage for the year of 1967. In 1969 there were only 10 days of maximum usage. It is hoped that we can expect a continuing decrease in this factor in the future.

In Table 6, we have brought the total consumption in lb/mil gal of activated carbon, coagulants, and chlorine up to date through 1969. The total carbon consumption for 1969 is the lowest amount in the 12-year period. The average lb/mil gal (18) is also the lowest for this period. The average lb/mil gal of coagulants used (104) for the same period equals the overall 12-year average (104) but is still considerably higher than the basic value of 90 lb/mil gal mentioned above. The average chlorine dosage (16.1 lb/mil gal) is the lowest since 1959 and is also lower than the overall average for the 12-year period (19.2 lb/mil gal). It is somewhat in excess of the 13 lb/mil gal, the basic figure mentioned above. In Table 7, we have brought the cost of the three classes of chemicals for each of the years up through 1969. It is noted that the cost of activated carbon ($1.58/mil gal) is the lowest cost for the last 12 years and also is lower than the overall average value of $1.88/mil gal. The 1969 cost of coagulants ($1.86/mil gal) is the lowest since 1961 and is also lower than the 12-year average of $1.95/mil gal. The cost of chlorine ($1.01/mil gal) is slightly above the 1969 cost and also higher than the overall average of $0.90/mil gal for the 12-year period. In Table 8, we have listed the contract prices per ton for alum, carbon, and chlorine, as delivered to Chicago's two water filtration plants.

It is noted that the price of alum has risen from $39.95/ton in 1965 to $43.75/ton in 1969. Activated carbon, which remained constant for many years, had risen from a cost of $156.70/ton in 1965 to $178.00/ton in 1968. In 1969 it dropped to $173.00/ton due to lower freight charges for the use of "Jumbo" air slide cars. Chlorine has risen from the low point of $83.20/ton in 1965 to the cost of $95.40/ton in 1969. While these increases in prices are significant, they are only one of the reasons for the increases in the total cost of chemical treatment as outlined above.

Illinois Sanitary Water Board Parameters Exceeded at SWFP

In Table 9, we have listed the number of days tested and the number of days in which the established parameters were exceeded for 17 of the 24 parameters adopted by the Illinois Sanitary Water Board for the southern end of Lake Michigan and the Calumet area on September 6, 1966. To the values for the years 1965, 1966, 1967, and 1968, we have added the values for 1969. During 1969, the coliform bacteria did not exceed the daily average value of 2500/100 ml on any day of the days tested. The fecal streptococci in 1969 exceeded the base standard of 25/100 ml on 3 days of 352 days tested. The threshold odor in 1969 exceeded the single day's value of 8 on 9 days of 365 days tested and the daily average value of 4 on 19 of 365 days tested. The ammonia nitrogen exceeded the daily average value of 0.05 ppm on 17 days of 365 days tested. The total phosphates exceeded the single day's value of 0.04 ppm on 184 days out of 363 days tested in 1969. It is significant that the values exceeding the basic parameters most often are those contributing to plankton nuisances (namely, ammonia nitrogen and total phosphates) and taste and odor problems (namely, threshold odors and phenol-like substances).

LEGEND:
≯ Not more than
≮ Not less than

TABLE 9
CONTROL POINT - OPEN WATER
SOUTH WATER FILTRATION PLANT
COMPARISON OF ACTUAL RESULTS WITH WATER QUALITY CRITERIA
1965-1969

PARAMETER	QUALITY CRITERIA			ANNUAL									
				Exceeding Daily Average					Exceeding Single Value				
				1965	1966	1967	1968	1969	1965	1966	1967	1968	1969
Coliform Bacteria	Annual Avg.	≯	200										
(MPN/100 ml)	Daily Avg.	≯	2,500	2/365	0/364	6/364	0/360	0/364					
Fecal Streptococci													
(Number/100 ml)	Single Day	≯	25						14/127	4/294	8/339	7/359	3/352
True Color	Annual Avg.	≯	5										
(Units)	Single Day	≯	15						0/1	0/218	0/309	0/322	0/349
Threshold Odor	Single Value	≯	8						4/365	37/365	23/365	14/366	9/365
	Daily Avg.	≯	4	7/365	52/365	35/365	22/366	19/365					
Temperature (°F)	Single Day	≯	85						0/365	0/344	0/365	0/365	0/339
pH	Annual Range		8.1-8.4										
(Units)	Daily Range		7.7-9.0	0/365	0/364	0/365	0/365	0/365					
Dissolved Oxygen	Annual Avg.	≮	90										
(Percent Saturation)	Single Day	≮	80						2/4	0/10		0/0	1/34
Ammonia Nitrogen	Annual Avg.	≯	0.02										
(mg/1)	Daily Avg.	≯	0.05	26/365	43/365	67/365	8/366	17/365					
Methylene Blue Active	Annual Avg.	≯	0.05										
Substance (mg/1)	Single Day	≯	0.20						0/23	0/83	0/78	0/141	0/150
Chlorides	Annual Avg.	≯	8										
(mg/1)	Single Day	≯	15						0/170	0/281	1/340	0/360	0/346
Cyanides (mg/1)	Single Day	≯	0.025						0/28	0/11	0/18	0/36	0/46
Fluorides	Annual Avg.	≯	1.0										
(mg/1)	Single Day	≯	1.3						0/227	0/277	0/339	0/365	1/365
Dissolved Iron	Annual Avg.	≯	0.15										
(mg/1)	Single Day	≯	0.30						0/79	0/271	0/340	0/363	0/364
Phenol Like Substances	Annual Avg.	≯	0.001										
(mg/1)	Single Day	≯	0.003						48/74	224/272	9/198	16/261	7/360
Sulfates	Annual Avg.	≯	23										
(mg/1)	Single Day	≯	50						0/149	0/272	0/345	0/358	0/362
Total Phosphates	Annual Avg.	≯	0.03										
(mg/1)	Single Day	≯	0.04						34/166	43/266	222/337	239/362	84/363
Filterable Residue	Annual Avg.	≯	162										
(mg/1)	Single Day	≯	200						0/4	0/98	0/102	0/253	3/257

Number of days exceeding criteria/Number of days tested

Bureau of Water, Department of Water and Sewers, City of Chicago

North Shore Lake Surveys

During the year 1969, five surveys were made of Lake Michigan along the west shore extending from a point near Chicago's Dever Crib to a point opposite Waukegan. The location of the sampling points is indicated on Figures 14, 15, and 16. The averages of the five surveys are shown in Table 10 (chemical parameters) and in Table 11 (bacterial parameters).

These North Lake Surveys have been carried on for several years. On Figures 14, 15, and 16, we have plotted the annual averages of 1968 and 1969 for Total Phosphates, Ammonia Nitrogen, Total Coliform, and Fecal Coliform Bacteria. The Annual Average limit and the Single Daily Value limit for each parameter are indicated by straight lines. The locations of the sampling points as relating to the given parameters are indicated by connecting lines.

If we consider the values for total phosphates as plotted on Figure 14, it can be seen that in 1968 the Annual Average limit (0.03 ppm) and the Single Daily Value limit (0.04 ppm) as listed in SWF-7 (for the Open Water of Lake Michigan) were exceeded at every point. The highest values were from a point near North Chicago. In 1969, the values at all points exceeded the limits with the exception of the Annual Average limit at Point 11N near Chicago's city limits. The highest values were again from 6N near North Chicago.

In considering the values for Ammonia Nitrogen as plotted on Figure 15, it is noted that the Annual Average Values exceed the limits (0.02 ppm) at all points. The Single Daily Values exceed the limits (0.05 ppm) at

TABLE-10

NORTH SHORE LAKE SURVEYS
1969

CHEMICAL SUMMARY TABLE

PT. NO.	TEMP °F			pH			THRESHOLD ODOR			M.B.A.S. (ppm)			AMMONIA NITROGEN (ppm)			PHENOL (ppm)			PHOSPHATE (ppm)		
	X	MAX	AVG.	X	MAX.	AVG.	X	MAX	AVG.	X	MAX.	AVG.	X	MAX.	AVG.	X	MAX.	AVG.	X	MAX.	AVG.
1	5	72	58	5	8.62	8.45	5	5 DsM	3	5	N.D.	N.D.	5	0.06	0.03	5	0.001	N.D.	5	0.10	0.05
2	5	71	57	5	8.70	8.45	5	6 Mm	3	5	N.D.	N.D.	5	0.05	0.03	5	N.D.	N.D.	5	0.08	0.04
3	5	71	57	5	8.70	8.46	5	4 DM	3	5	N.D.	N.D.	5	0.06	0.03	5	0.005	0.001	5	0.08	0.04
5	5	68	56	5	8.75	8.50	5	48 Df	11	5	N.D.	N.D.	5	0.08	0.03	5	0.043	0.010	5	0.07	0.04
6	5	69	56	5	8.75	8.50	5	20 Df	7	5	N.D.	N.D.	5	0.06	0.02	5	0.006	0.001	5	0.06	0.05
7	4	67	57	4	8.65	8.44	4	4 DMm	3	4	N.D.	N.D.	4	0.11	0.05	4	0.011	0.003	4	0.12	0.05
8	5	69	56	5	8.70	8.53	5	20 Df	6	5	N.D.	N.D.	5	0.06	0.07	5	0.001	N.D.	5	0.06	0.03
9	5	71	53	5	8.65	8.47	5	9 Df	4	5	N.D.	N.D.	5	0.05	0.02	5	0.003	0.001	5	0.06	[illegible]
10	5	70	56	5	8.70	8.50	5	10 DM	5	5	N.D.	N.D.	5	0.04	0.02	5	0.003	0.001	5	0.07	0.03
11	5	70	56	5	8.72	8.48	5	7 DM	4	5	N.D.	N.D.	5	0.05	0.02	5	0.004	0.001	5	0.05	0.02

X NO OF TEST N.D.-NOT DETECTABLE

WRS.S.

WATER PURIFICATION DIVISION

TABLE-II

NORTH SHORE LAKE SURVEYS
1969

BACTERIAL SUMMARY TABLE

PT. NO.	PLATE COUNT NO/ml.			COLIFORM/100 ml. M.F.			FECAL/100 ml. (M.F.) COLIFORM			FECAL/100 ml. (M.F.) STREP		
	X	MAX.	AVG.	X	MAX.	AVG.	X	MAX.	AVG.	X	MAX.	AVG.
1	5	130	66	5	5600	1170	5	6	2	5	0	0
2	5	330	91	5	1600	378	5	6	2	5	0	0
3	5	210	83	5	112	50	5	2	1	5	0	0
5	5	100	55	5	290	130	5	10	2	5	4	1
6	5	120	63	5	400	126	5	4	1	5	0	0
7	4	570	191	4	560	140	4	38	10	4	4	1
8	5	33	13	5	68	23	5	0	0	5	0	0
9	5	25	10	5	128	26	5	0	0	5	0	0
10	5	35	21	5	64	23	5	4	1	5	2	0
11	5	250	86	5	1100	257	5	4	1	5	0	0

X-NO OF TEST

W.Q.S.S.

WATER PURIFICATION DIVISION

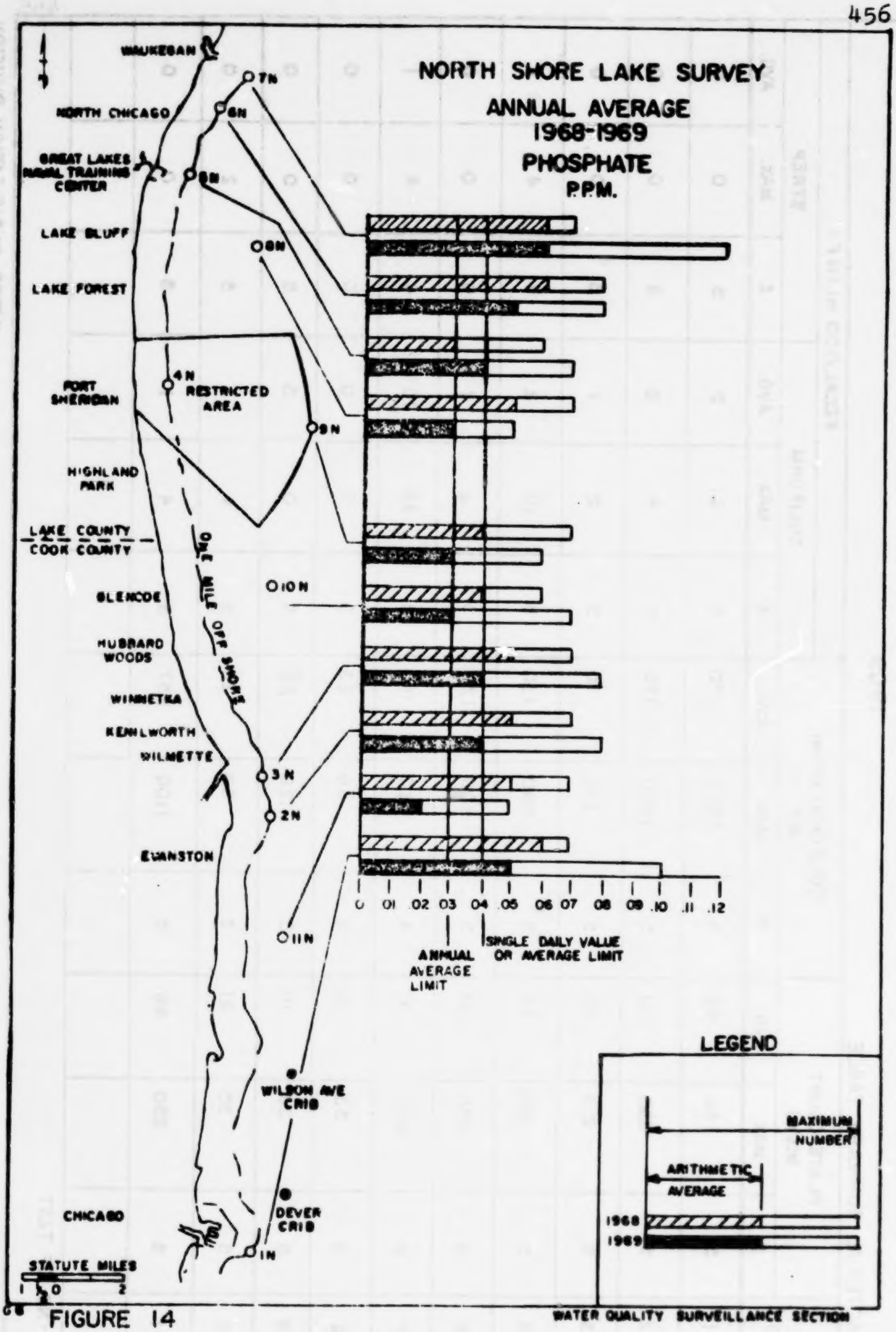

FIGURE 14

WATER QUALITY SURVEILLANCE SECTION

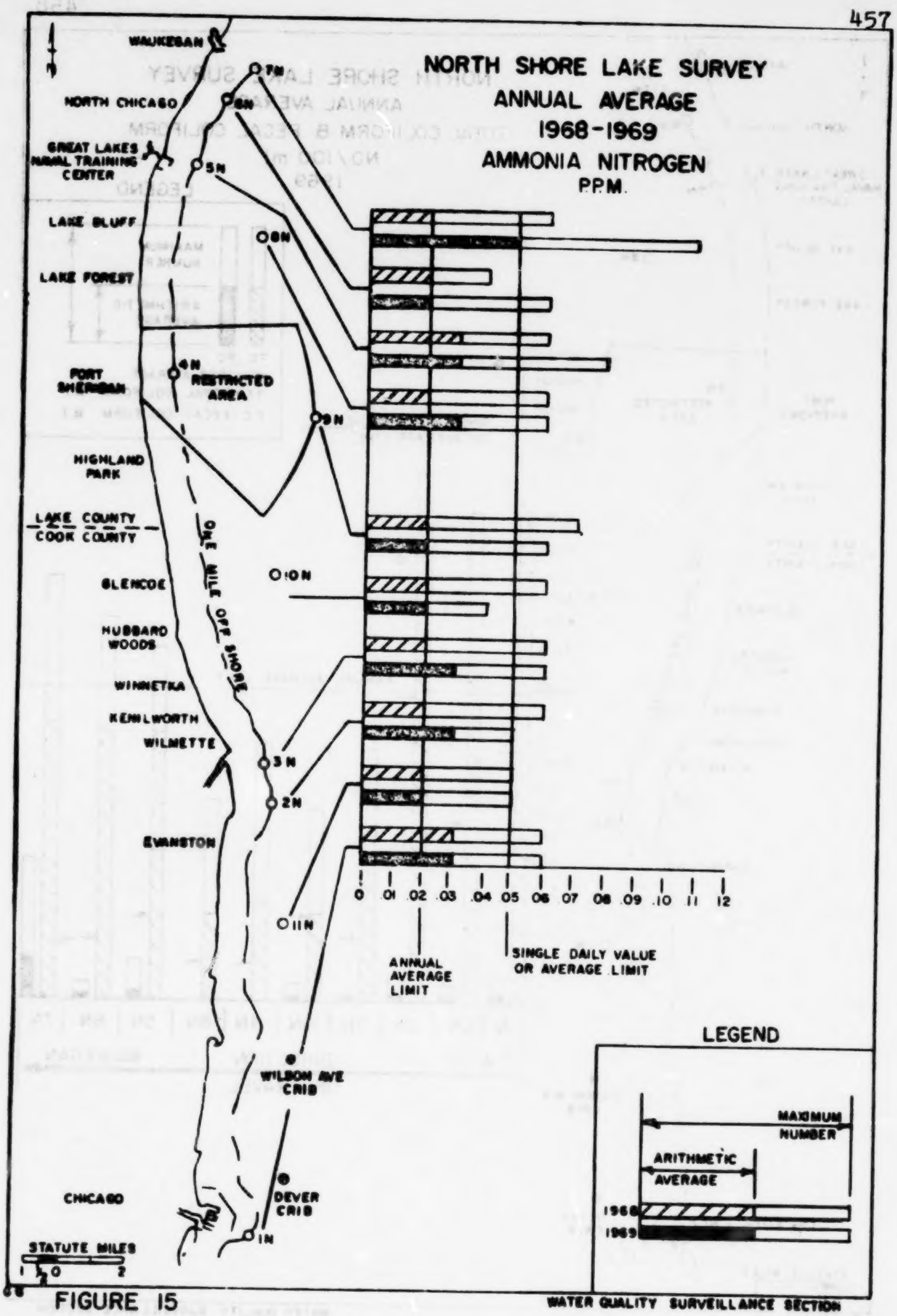

FIGURE 15

WATER QUALITY SURVEILLANCE SECTION

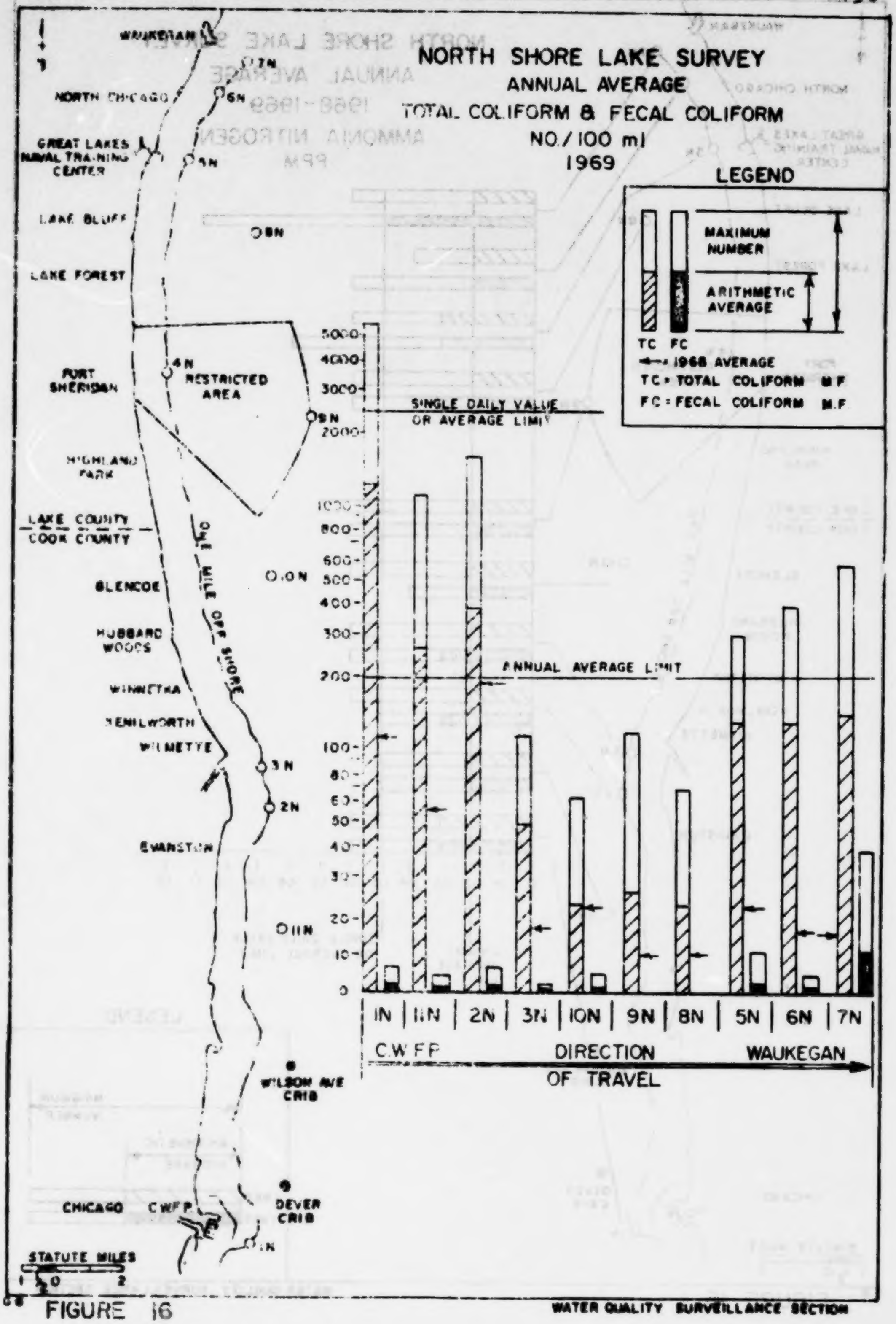

FIGURE 16

WATER QUALITY SURVEILLANCE SECTION

all points except two, 5N off shore from the Great Lakes Naval Training Station and 10N off shore from Glencoe. The highest values are from Point 7N off shore from Waukegan.

On Figure 16, we have plotted the Annual Average Values and the Single Daily Values for Total Coliform and Fecal Coliform. We have included the Fecal Coliform Values because there seems to be some thinking among microbiologists (formerly bacteriologists) that the Fecal Coliform are more significant from a water quality point of view than Fecal Streptococci. Perhaps it would be well to have a limit of 200 Fecal Coliform Bacteria per 100 ml for open and shore water as recommended by Mr. Geldreich of the Environmental Control Administration at Cincinnati.[5] It is noted that the Annual Average limit for Total Coliform Bacteria of 200/100 ml is exceeded at 3 points--1N, 2N, and 11N--all points of the surveys closest to the intake of the CWFP. The Single Daily Value for Total Coliform (2500/100 ml) is exceeded at only one point, 1N, which is the point nearest the CWFP intake. Three higher results for Single Daily Values are from Points 5N, 6N, and 7N off shore from the Great Lakes Training Station, North Chicago, and Waukegan, in the same order. The 1968 values for Total Coliform are indicated by arrows. It is most obvious that along the west shore of Lake Michigan, just north of Chicago, that the bacterial level sharply increased in 1969 as compared with 1968. This is a matter of great concern to those of us who are responsible for water treatment in the City of Chicago.

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5. Geldreich, E. E., Bacteria and Recreation Water. Jour. AWWA, Vol. 62, No. 2 (Feb. 1970)

FINAL CONCLUSIONS

The water treated at SWFP showed a marked improvement in 1969 except for Phosphorous, Nitrogen, and Threshold Odor values. The water along the west shore, north of Chicago, showed in 1969 a marked decline in quality as measured by the Phosphorous, Nitrogen, and Total Coliform parameters. It is hoped that immediate and drastic action will be taken to improve the quality of discharges to Lake Michigan along the North Shore.

J. C. Vaughn

MR. VAUGHN: You will notice on the inside of the cover I give credit to my staff, without which there would be no report.

We look at the first slide and sort of get ourselves in perspective as to the relation of Chicago's water plants. We are concerned with the area of the lake from the Indiana Harbor Ship Canal to Waukegan. The South Water Plant intake is about nine miles from the Indiana Harbor Ship Canal. It is about three miles from the mouth of the Calumet River, which is sometimes suspected of being a source of pollution. (Laughter.) The Central Plant is about 18 miles from the ship canal and is stated 2-1/2 miles from Waukegan. So we are concerned with this entire area of the lake.

Now, we have changed the title a little bit, so with your permission I will read this and I hope I do not read too rapidly for Mrs. Rankin and Mr. Stein.

Lake Michigan water quality as related to Chicago's water treatment plants. Introduction and Summary.

This is the third report which the city of Chicago has presented to sessions of this conference.

J. C. Vaughn

In the earlier reports, we were required by the nature of the data then available to present a pessimistic view of changes in water quality of Lake Michigan at Chicago. In this one, the more recent data permit us to express a cautious and qualified optimism.

Water quality at the South Water Filtration Plant (SWFP) is beginning to show some signs of the improvement which we hoped would follow as a result of this conference. Frequency and average duration of severe odor periods decreased considerably during 1969, permitting a large decrease in average activated carbon dosage. Concentrations of total phosphate decreased during the same period, although the average concentration was above the maximum in the applicable standard of the Illinois Sanitary Water Board. Bacteriological quality at SWFP improved; plankton counts were lower, with a very recent exception which I will mention later. However, concentrations of refractory inorganics, better known to us old-timers as filterable residue or total dissolved solids, increased approximately as predicted on the basis of past data.

At a previous session it was noted that, although Chicago has long been conducting surveys of the area near the northern boundary of the city, none of these data were included in our reports to the conference. As an aside, that was because under the original FWPCA criteria the South Water Filtration Plant was one of the control points at the southern end of Lake Michigan. This omission has been repaired in the present report. Significant information has been added in Tables 10 and 11, and the most important parameters are shown in figures 14, 15 and 16. Data included cover 1968 and 1969 to provide some basis for comparison. With the possible exception of total phosphate concentrations, nothing in these data suggests that water quality improved in the area covered by the surveys, meaning of the North Lake. They tend, rather, toward the opposite conclusion.

To avoid needless repetition, some of the other tables present data for 1968 and 1969 only. Persons interested in data for earlier years are referred to the reports already cited and to a paper by Mr. H. H. Gerstein in the Journal of the American Water Works Association.

This current report incorporates a simpler system for numbering tables and figures than the one used earlier. Since it is believed that anyone seriously seeking information will not be inconvenienced, no cross references are included. Otherwise, barring the additional data included, this report follows generally the form of the earlier ones.

Discussion of data, bacterial pollution.

The average and maximum coliform bacteria per 100 milliliters at the SWFP intake (raw water header) for the year 1969 have been added to table 1 and plotted on the same sheet as figure 2. It is noted that the average coliform of 59 per 100 milliliters for 1969 is higher than the average for 1965, but not so high as the value of 260 per 100 milliliters for 1967 and 82 for 1968. The maximum value of 980 per 100 milliliters for 1969 is the lowest value recorded since 1954.

At the Central Water Filtration Plant, hereafter known as CWFP, the bacterial quality of the raw water showed a significant decline. Some abnormally high bacterial counts occurred. For example, on March 25 the confirmed coliform count on the raw water was 970 per 100 milliliters, on April 19 1,300 per 100 milliliters, July 27 910 per 100 milliliters, August 24 4,400 per 100 milliliters, and September 3 916 per 100 milliliters. The 1969 average was 100 per 100 milliliters. These maximum values are out of all proportion to the annual value. This indicates periodic contamination from the discharge of inadequately treated sewage to the lake. One incident of another kind of poor quality water occurred in early spring. An organic material was found in the water which produced an objectionable taste and odor after several days in the distribution system. A sample of this wastewater taken near the suspected discharge point had a chemical oxygen demand of 15.6 parts per million as compared with a normal 4 to 6 parts per million range for the lake water. We expect to use chemical oxygen demand as a parameter a great deal in the future and we are getting set to do total organic carbons. We hope that these two factors will give us a great deal more accurate information about the pollutants going to the lake.

Abnormal pollution at SWFP intakes.

The data on abnormal hydrocarbon (oil refinery wastes) odor periods for the past 20 years were brought up to date through 1969 in table 2, it is on the slide there, and are plotted on figure 3 which follows that. The number of odor periods, 15 during 1969, is the lowest value since 1956. The number of odor days, 42, is the lowest value since 1960. The maximum threshold odor reached during this period was 13 CH, meaning chemical hydrocarbon, the lowest maximum since 1950. The maximum activated carbon dosage applied, 557 pounds per million gallons, in 1969 exceeds the similar maximum value of 411 pounds per million gallons for 1968 and equals the 557 pounds per million gallons reached in 1967. The rise in this maximum value over the 1968 value indicates that the odor was more difficult to remove. It must be remembered that a water treatment plant must be prepared to treat the maximum demands that will be placed upon it as to quantity and quality. Otherwise an unsatisfactory water supply will frequently be delivered to the consumer.

In table 3 the data for 1969 for maximum ammonia nitrogen in parts per million, maximum activated carbon in pounds per million gallons, and maximum chlorine dosage in pounds per million gallons have been added. The maximum ammonia nitrogen value of 0.250 parts per million equals that for 1968 and is less than the values for 1966 and 1967. The maximum carbon dosage, 555 pounds per million gallons, exceeds the equivalent values for 1965 and 1966 and is equal to the maximum value for 1967. The maximum chlorine dosage, 37.8 pounds per million gallons, is the lowest figure since 1962, but is considerably less than the equivalent value for 1967.

All of these data show some improvement, but the values are still much above those considered desirable for daily water treatment. In table 4 we have summarized the total activated carbon applied in pounds per year. These data are plotted on figure 4. The average pounds per million gallons of 18 is well below all the averages since 1950. The total carbon applied during 1969 amounted to 2,542,600 pounds. This is 2,336,709--I will agree to erase the 9--2,336,700 pounds less than was used in 1968 and is the lowest yearly total, by I think a little more than 50 percent, since 1956. The maximum activated carbon dosage during abnormal oil refinery type odor periods is plotted on figure 5.

Pollution of rivers discharging to the lake 1950-1969.

In the basic paper we reported on the value of certain parameters on samples taken from a number of points on the Calumet River, Grant Calumet River, Little Calumet River, and the Indiana Harbor Ship Canal, hereafter known as the IHSC. The locations of these sampling points are shown in figure 6. We are most concerned with the contribution of pollutants to the water in the southern end of Lake Michigan by the IHSC and occasionally the Calumet River. It is interesting to point out a variation in samples taken at Point 13, which is located on the Grand Calumet River at Forsythe Avenue on December--on Forsythe Avenue. There should be a period there. On December 15, 1969, the ammonia nitrogen value of a water sample from this point was 14 parts per million. Other weekly test results have been of the same order of magnitude. Since the average value at Point 9, IHSC and Dickey Road, was only 7.46 parts per million, there must be some periodic discharge of higher ammonia content waste near this point.

In figure 7 the annual average coliform organisms per

100 milliliters are plotted for the IHSC at the Dickey Road Bridge and the Calumet River at the 92nd Street Bridge. The values for 1969 have been added to the values for the previous years. There is a considerable dropoff in the value of coliform organisms in the samples taken from the IHSC at the Dickey Road Bridge. However, the average value for 1969 of 1,350,000 coliform per 100 milliliters is a figure much too high for a desirable raw water. The value at the 92nd Street Bridge on the Calumet River shows a slight dropoff and has not been significant in previous years. The 1969 value of 59,000 per 100 milliliters for the samples taken at the 92nd Street Bridge fits the general pattern.

In figure 8 the average ammonia nitrogen values in parts per million are plotted for the two points under discussion. Surprisingly, the average value of 7.46 parts per million ammonia nitrogen for the samples taken at the Dickey Road Bridge for the 1969 period is far in excess of any previously recorded value. We have no explanation for this increase in ammonia nitrogen value. It might be deduced that the efficacy of treatment of sewage plant effluents being contributed to the Ship

Canal is not as high as could be desired or even expected. There has been a slight decrease in the ammonia nitrogen value of the samples taken at the 92nd Street Bridge of the Calumet River. The 1968 average value was 0.99 parts per million and the 1969 value is 0.94.

In figure 9 the annual average phenol values in parts per million for the same two tributary points are shown. The averages for the 1969 period have been added to the plotted results of the previous years. At both points there has been a further slight decrease in the phenol values.

Migration of pollution slugs.

In the previous reports this migration of pollution slugs has been described in considerable detail. This problem still exists and represents a variability in the problems of water treatment that is not always predictable. Again, some of the slugs of pollution that have beset the SWFP and some of the North Shore filtration plants have migrated to the intake of the CWFP.

J. C. Vaughn

Plankton problems.

The nature of the general plankton problems besetting the SWFP is described in considerable detail in the basic report. This description will not be repeated. The number of plankton microorganisms per milliliter as the annual average and the maximum days are plotted on figure 10. It is noted that the maximum day for the 1969 period is considerably in excess of any value since 1964, with the exception of 1968. Similarly, the annual average for the same period exceeds any previous value since 1964 except for 1968. The 1969 average value is 2,000 per milliliter and the maximum value is 10,500 per milliliter. It is pointed out that these values do not indicate the breakdown count of the individual organisms. There was no occurrence during 1969 when the water had an extremely fishy taste attributable to the high incidence of Dinobryon. The values do not show the incidence of Cladophora. This organism has been a continuing nuisance. It is torn loose from the beds where it grows, gets into the intake basin, and collects on the fixed screens. Within another year we hope to have revolving screens with high pressure jets for cleaning at the south plant and we will eliminate this particular operational problem. The hand labor required to remove the Cladophora from the screens is excessive and is required intermittently over a period of as long as six months. Perhaps the increase in plankton nuisances may be attributed in part to the increase in the quantity of ammonia nitrogen contributed to the southern end of the lake by the IHSC and the Calumet River as indicated above.

Now, I would like to depart from the text to give you our most recent experience, just last week and for the past several weeks. In previous reports we have discussed the incidence of wintertime diatoms, indicating that with the levels of nitrogen and phosphorus in the lake being above the minimum required for continuing plankton nuisances we are now having a year-round nuisance, and we have had in this last week a very high incidence of the wintertime diatoms, the stephanodiscus hantzschii and the stephanodiscus binderanus, and just on the 26th of March we reached a maximum count of 28,800 total plankton count and 27,300 of these were the two stephanodiscus organisms. These diatoms, being photosynthetic, assimilate carbondioxide, which is almost nonexistent in Lake Michigan waters, so being a simple organism they adapt themselves and when they extract the carbondioxide from the magnesuim and calcium bicarbonates in the lake, this produces calcium carbonate, which hydrolizes and precipitates this colloidal calcium carbonate and raises the pH. We have been recording pHs in the 8.7 to 8.9 range for some weeks and on the 26th we reached at the South Plant a pH of 9.10.

To adequately coagulate water you must lower the pH to 7.65 or lower and this takes considerable alum. Our alum dosages have ranged from 50 to 100 percent over the 90 pound normal dosage. So the presence of nutrients, the continuing plankton nuisance, result in a considerable increase in operating costs.

That is not in this text. It happened since it was written.

Prevailing trends of chlorides and sulfates in Lake Michigan water.

Several years ago, as part of the work of the Municipal Subcommittee of the Technical Advisory Committee to the Great Lakes-Illinois River Basin Project, known as GLIRB, now absorbed in the FWPCA, Dr. T. E. Larson, head of the Chemical Division of the State Water Survey, plotted the results of analyses of chlorides and sulfates from samples of Lake Michigan water taken at Dunne Crib. This crib is one of the two intakes of the SWFP. These analyses were begun in 1860. There was a period of greater frequency in the 1900-1910 period. About 1926 the frequency of samples was greatly increased. Dr. Larson has drawn trend lines through the points representing these values. I have stated that these lines, if projected, show values of sulfates at 30 parts per million by the year 2000 and of chlorides at 12 parts per million also by the year 2000. The plotting of these data may be seen in the figure now on the screen, figure 11.

Philip A. Reed, my technical assistant, who is in the audience, who is also responsible for all of the data submitted in this report and much of the text, has superimposed some of the data from our own files for chloride and sulfate values onto those of Dr. Larson's. This gives a good record from 1926 through 1969. Mr. Reed has drawn some regression lines through the points which, if projected to the year 1975, will predict values of 23 parts per million for sulfates and 7.7 parts per million for chlorides. The plotting of these data may be seen on the figure now on the screen, figure 12.

The concentrations of sulfate and chloride are not large enough to be significant in themselves, although sulfates are present in concentrations comparable to those in Lake Erie, and in 1960 were increasing at a more rapid rate than in Lake Erie. The significance lies in the continuous increase of sulfates and chlorides, the increasing burden of dissolved matter carried by the lake water, and the fact that this dissolved matter is being put into the lake by human activity.

Closer examination of the more recent and more comprehensive results suggested that the increase in sulfate and chloride concentrations could be represented equally well by a straight line. In figure 12 the dashed straight lines are least-squares regression lines developed from data collected at Chicago between 1926 and 1968. The curved solid lines are extrapolations from the curves in figure 11. Data for 1969 have been added. The crosses represent the average values for the year, the short straight lines above and below them represent the highest and lowest monthly averages for the year. The concentration of sulfate predicted for 1969 was 21.7 parts per million, the actual average was 23 parts per million. Obviously, the sulfate concentration rose much more rapidly than expected on the basis of past data.

Concentration of chloride actually decreased during the year. Instead of the predicted value of 7.6 parts per million the average was 7.1 parts per million. Since the concentration increase of chloride through a cycle of use is expected to be from 1.50 to 2 times that of sulfate, the logical conclusion is that less sewage treatment plant effluent probably entered the lake in 1969 than in previous years. The increase in sulfate then must be caused by an increase in industrial wastes. We actually suspect some pickle liquor. The implication of these concentration changes for regulatory agencies are too obvious to need spelling out.

Cost of treating polluted water.

From the basic report this statement is repeated:

J. C. Vaughn

Any condition requiring the use of 20 pounds of activated carbon per million gallons of water or more than 13 pounds of chlorine per million gallons will be recorded as a pollution load on the plant. When the carbon feeds are increased to 40 pounds per million gallons, more coagulant is needed to aid in the settling out of the carbon. After a study of operating data, it was concluded that except in periods of high turbidity any coagulation dosage of over 90 pounds per million gallons may be charged to the carbon requirement, therefore to the pollution load.

In the basic report we used the expression "some maximum days of usage," meaning those days at the SWFP in which the total pounds of activated carbon fed amounted to 30,000 pounds or more. The number of days in which this occurred for 1968 are shown there on the table, table 5, and for 1969 in the continuation which is shown on the next slide.

Let's go back to the other slide momentarily just to look at that. In 1968 there were 39 days. You don't have to count them. And in 1969 there were only 10 days of maximum usage.

J. C. Vaughn

The maximum threshold odor hours for each of these days is listed under that heading and the maximum ammonia nitrogen hours are likewise listed under their heading. And I have given you the total days.

In 1969 there were only 10 days of maximum usage. It is hoped that we can expect a continuing decrease in this factor in the future.

In table 6, the next slide, we have brought the total consumption in pounds per million gallons of activated carbon, coagulant and chlorine up to date through 1969.

The total carbon consumption for 1969 is the lowest amount in the 12-year period. The average pounds per million gallons of 18 is the lowest for this period. The average pound per million gallons of coagulants used, 104, for the same period equals the overall 12-year average of 104 pounds, but is still considerably higher than the basic value of 90 pounds per million gallons mentioned above. The average chlorine dosage of 16.1 pounds per million gallons is the lowest since 1959 and is also lower than the overall average for the 12-year period, which is 19.2 pounds per million gallons.

It is somewhat in excess of the 13 pounds per million gallons mentioned above.

In table 7 we have brought the cost of the three classes of chemicals for each of the years up through 1969. It is noted that the cost of activated carbon, $1.58 a million gallons, is the lowest cost for the last 12 years and is also lower than the overall average of $1.88 a million gallons. The 1969 cost of coagulants, $1.86 per million gallons, is the lowest since 1961 and is also lower than the 12-year average of $1.95 per million gallons. The cost of chlorine, $1.01 a million gallons, is slightly above the 1968 cost--1969 in that line should be 1968--and also higher than the overall average of about 90¢ a million gallons for the 12-year period.

In table 8, also on the bottom of this slide, we have listed the contract prices per ton for alum, carbon and chlorine, as delivered to Chicago's two water filtration plants. It is noted that the price of alum has risen from $39.95 a ton in 1965 to $43.75 a ton in 1969 and we just got the 1970 bid and it is $43.80. In the same supply why any supplier would raise the bid price 5¢ a ton is beyond me. Activated carbon, which remained constant for many years, had risen from a cost of $156.70 a ton in 1965 to $178.00 a ton in 1968. In 1969 it dropped to $173.00 a ton due to lower freight charges through the use of Jumbo air slide cars. That is 60-ton cars, which are quite sizable. Now we just got the bids a few months ago on the 1970 carbon contract. For the first time in 25 years we have competition in the business and the new supplier, supplying a very good activated carbon, bid $170.00 a ton and the supplier that had the contract for 25 years bid $18.00 a ton more than that, $188.00, so we are now getting it for $170.00. Chlorine has risen from the low point of $83.20 a ton in 1965 to a cost of $95.40 a ton in 1969 and in the bids just received we will be paying $99.40 in 1970. While these increases in prices are significant, they are only one of the reasons for the increases in the total cost of chemical treatment as outlined above.

Illinois Sanitary Water Board parameters exceeded at SWFP.

In table 9 we have listed the number of days tested and the number of days in which the established parameters were exceeded for 17 of the 24 parameters adopted by the Illinois Sanitary Water Board for the southern end of Lake Michigan and the Calumet area on September 6, 1966. To the values for the years 1965, 1966, 1967 and 1968 we have added the values for 1969. During 1969 the coliform bacteria did not exceed the daily average value of 2,500 per 100 milliliters on any day of the days tested. The fecal streptococci in 1969 exceeded the base value of 25 per 100 milliliters on 3 days of the 352 days tested. The threshold odor in 1969 exceeded the single day's value of 8 on 9 days of the 365 days tested and the daily average value of 4 on 19 of the 365 days tested. The ammonia nitrogen exceeded the daily average value of 0.05 parts per million on 17 days of the 365 days tested. The total phosphates exceeded the single day's value of 0.04 parts per million on 184 days out of 363 days tested in 1969. It is significant that the values exceeding the basic parameters most often are those contributing to plankton nuisances, namely ammonia nitrogen and total phosphates, and taste and odor problems, namely threshold odors and phenol-like substances.

J. C. Vaughn

North Shore lake surveys.

During the year 1969 five surveys were made of Lake Michigan along the west shore extending from a point near Chicago's Dever Crib to a point opposite Waukegan. The location of the sampling points is indicated on figures 14, 15 and 16. The averages of the five surveys are shown in table 10 for chemical parameters and in table 11 for bacterial parameters.

These North Lake surveys have been carried on for several years. On figures 14, 15 and 16 we have plotted the annual averages of 1968 and 1969 for total phosphates, ammonia nitrogen, total coliform and fecal coliform bacteria. The annual average limit and the single daily value limit for each parameter are indicated by straight lines. The locations of the sampling points as relating to the given parameters are indicated by connecting lines.

If we consider the values for total phosphates as plotted on figure 14, as seen on the screen now, it can be seen that in 1968 the annual average of 0.03 parts per million and the single daily value limit of 0.04 parts per million as listed in SWF-7 for the open waters of Lake Michigan were exceeded at every point. The highest values were from a point near North Chicago. In 1969 the values at all points exceeded the limits with the exception of the annual average limit at Point 11N near Chicago's city limits. The highest values again were from 6N near North Chicago.

In considering the values for ammonia nitrogen as plotted on figure 15, it is noted that annual average values exceed the limits of 0.02 parts per million at all points. The single daily values exceed the limits of 0.05 parts per million at all points except two, 5N offshore from the Great Lakes Naval Training Station and 10N offshore from Glencoe. The highest values are from Point 7N offshore from Waukegan.

On figure 16 we have plotted the annual average values and the single daily values for total coliform and fecal coliform We have included the fecal coliform values because there seems to be some thinking among the microbiologists, formerly known to us old-timers as bacteriologists, that the fecal coliform are more significant from a water quality point of view than fecal streptococci. Perhaps it would be well to have a limit of 200 fecal coliform bacteria per 100 milliliters for open and shore water as recommended by Mr. Geldreich of the Environmental Control Administration at Cincinnati, according to an article published in the February Journal of the American Water Works Association by Mr. Geldreich, "Bacteria and Recreation Water."

It is noted that the annual average limit for the total coliform bacteria of 200 per 100 milliliters is exceeded at three points, 1N, 2N and 11N, all points of the surveys closest to the intake of the CWFP. The single daily value for total coliform of 2,500 per 100 milliliters is exceeded at only one point, 1N, which is the point nearest the CWFP intake. Three higher results for single daily values are from Points 5N, 6N and 7N, offshore from the Great Lakes Training Station, North Chicago and Waukegan, in the same order. The 1968 values for total coliforms are indicated by arrows alongside the vertical bars. It is most obvious that along the west shore of Lake Michigan just north of Chicago that the bacterial level sharply increased in 1969 as compared with 1968. This is a matter of great concern to those of us who are responsible for water treatment in the city of Chicago.

Now, to my final conclusion, Mr. Klassen answered some of the claims made herein and I will summarize to this extent.

The water treated at SWFP showed a marked improvement in 1969 except for phosphorus, nitrogen, and threshold odor values. Water along the west shore of North Chicago showed in 1969 a marked decline in quality as measured by the phosphorus, nitrogen, and total coliform parameters.

Now, in lieu of the final line I would like to remind you of a scene from a movie that some of us who are older saw years ago called Born Yesterday, with Judy Holliday and William Holden. Holden had been describing to Judy the significance of the various historical landmarks in the city of Washington. She listened to him a while and finally looked at him in that way she had and said, "You one of these guys going to talk all night, or do you want action?"

I want action, gentlemen. Thank you.

(Laughter and applause.)

MR. STEIN: Thank you, Mr. Vaughn, for a really excellent report.

You are doing something, I guess, which should be done everywhere, and that is someone should be checking the water while the program is going on to see how well we are doing. You are supplying that service to us, for which we are appreciative.

Are there any comments or questions?

MR. MILLER: Mr. Stein.

MR. STEIN: Yes.

MR. MILLER: I would like to make a comment. In the text Mr. Vaughn referred to the increase in sulfate, and earlier this morning we had some discussion that a considerable amount of pickling liquor is now discharged underground. In fact, all the steel mills are now doing this. So, there have been great quantities of pickle liquor removed from the waterways discharging to the lake.

Also in addition, a number of the steel mills have converted to hydrochloric rather than to sulfuric acid. Our sampling stations in the Indiana Harbor Canal would show some slight increase in chlorides and a decrease in sulfates, so that I am a little at a loss to correlate what is happening in the industrial plants to his comments in the report.

MR. VAUGHN: I would think that you probably have much more complete information. Once-a-week grab samples are merely indicators and not really revealing. What we try to do in Chicago is point the direction in which we are going and leave it to you regulatory bodies to follow up with the detailed analyses that are necessary for the regulation.

MR. POOLE: I think, Jim, that probably some of our people, as we used to do, it might be worthwhile if they sat down with you for a day with the data and looked it over, because this sort of intrigued me also.

MR. VAUGHN: We will be very happy to have them come up and discuss it at length with our laboratories, with our engineers who compile this data. Mr. Reed is here with me and he is thoroughly familiar with all of this and all of the background under which the data is collected.

MR. STEIN: Mr. Klassen.

MR. KLASSEN: Just one statement in there, Mr. Vaughn.

When you are discussing the increase in the coliform count in the lake, I think you stated here this indicates periodic contamination from the discharge of inadequately treated sewage to the lake. Granted this could be one source; but since you are only measuring coliform couldn't this also be influenced by land wash? Does it necessarily indicate that the increase in coliform would mean that there is inadequately treated sewage?

MR. VAUGHN: Well, it is recognized that there are other sources of the coliform bacteria, and we certainly had a graphic illustration this morning of what land wash can do. We have felt in Chicago that there isn't much farm land in the immediate watershed in the vicinity of Chicago and we haven't been concerned too much about that. We are concerned, though, about what can happen in high-rise buildings. We have had a number of complaints in high-rise buildings recently due to the eager beavers, some of the people who don't want to stand cross connections and back siphoning. We fully suspect that there are sanitary wastes coming from some of the high-rise buildings, although we haven't yet established the surveys to complete that. When we get a building, a complaint, I manage to bring in the plumbing inspectors and we give it a going over from top to bottom.

In that connection, I am satisfied for the first time in 25 years with the city that the facilities within Navy Pier are contributing no sanitary wastes to the lake. We did a dye test from bowl to bowl in that building by a good man, a good group of men, and I know that the plumbing in that building is in good shape.

MR. STEIN: Any comments or questions?

Yes, Mr. Purdy.

MR. PURDY: You mentioned where you took a water sample from a suspected discharge point and that it had an abnormal chemical oxygen demand and you leave the inference that this caused an abnormal condition in your water intake. What sort of a, say, action program does this sort of sampling set in motion? I mean do you report this to somebody, is somebody taking action, or what?

MR. VAUGHN: Oh, yes, we get on the telephone and we communicate with the Sanitary District and I call up Benn Leland and between us, why, we try to trace down the source of the problem.

This particular material, we have had this periodically over the last 20 years. It gets into our intakes and you can't recognize it, it has no characteristic odor unless you take samples continuously and run the chemical oxygen demand, which can't be done, or total organic carbon.

It is a slowly oxidizing material and when it gets out in the distribution system the chlorine continues to oxidize it. If it gets through your plant on Sunday, about Tuesday the people out in the edge of the system will start jumping on the phone and calling you up and saying, "The water tastes terrible. What have you done to it?"

And then we backtrack, we find out usually that Highland Park, Evanston, Glencoe and others have this same experience, and we raise a little cane about it. Sometimes we get it stopped, sometimes we don't.

MR. KLASSEN: Could this be natural growths in the lake like actinomycete?

MR. VAUGHN: Well, we have found actinomycetes present at this time. It is related to that, but we find actinomycetes at other times that do not have this taste and odor.

MR. STEIN: Any other comments or questions?

Thank you. The significance of these reports is that they have been very helpful to us all, Mr. Vaughn, because the question that we had when we got into Lake Michigan was this steady and graphic deterioration of the water at the water intake. Everyone knows the limitations of the grab samples and you have put this out yourself. We know the limitations. But we have had at least an indication that we have really stopped the abrupt deterioration. With this most optimistic of your reports that we have heard, hopefully if we can get the "hope" program going, we may be on our way to seeing the light at the end of the tunnel. I know a lot of us really held our breath on this. We are still doing it, but I am sure this is as per advertised. We never expected these waters to clean up overnight, even though we put all this work into it. But from your indication, they are surely not getting any worse than when we started.

MR. VAUGHN: Yes. As I mentioned at the last conference, the nitrogen and phosphorus are already above the minimum levels with continuing plankton usages and we may not stop completely the decline of the lake, but we can certainly slow down the rate of decline to a minimum amount.

MR. STEIN: Yes, I think you should look at this as a very real question once these nitrogen or phosphorus levels are in that lake at that level whether any stoppage of it can really ever get it reduced. And this is something we don't know the answer to yet. But no one is going to expect that to take place overnight.

Well, thank you very much.

I think given the time and the exigencies of the situation we will recess for about a half hour. Try to grab a sandwich and come back and then we will continue.

(RECESS)

MR. STEIN: Let's reconvene.

Benn, do you have any more for Illinois?

MR. LELAND: We are through.

MR. STEIN: May we go to Indiana, Mr. Poole?

MR. POOLE: I will introduce Perry Miller, who will present the Indiana report.

PERRY E. MILLER
DIRECTOR OF BUREAU OF ENGINEERING
INDIANA STATE BOARD OF HEALTH
INDIANAPOLIS, INDIANA

MR. MILLER: Mr. Chairman, conferees, ladies and gentlemen.

My name is Perry Miller. I am Director of the Bureau of Engineering, Indiana State Board of Health, and I am here presenting a statement on behalf of the Indiana Stream Pollution Control Board.

Mr. Chairman, I would ask that the report in its entirety be included as part of the record and I will not read all of it at this time.

MR. STEIN: Without objection, that will be done.

(Which said report is as follows:)

PROGRESS REPORT
FOR
CONFERENCE
ON

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN
(WISCONSIN - ILLINOIS - INDIANA - MICHIGAN)

RECONVENED MARCH 31, 1970

MILWAUKEE, WISCONSIN

ON BEHALF OF
THE
INDIANA STREAM POLLUTION CONTROL BOARD
AND
THE STATE OF INDIANA

MARCH, 1970

Introduction

The January, 1968, report prepared for the Conference on Pollution of Lake Michigan and its Tributary Basin provided a description of the Indiana portion of the Basin, a summary of water uses, and excerpts from the Implementation Plans of the Water Quality Standards for Lake Michigan and the St. Joseph River Basin. A listing of municipalities and industries provided details on the status of wastewater treatment facilities.

The Water Quality Standards include timetables for completion of municipal and industrial wastewater treatment facilities. Recommendations of the Conferees of the Conference of Lake Michigan and its Tributary Basin require municipalities to provide year-round effluent disinfection by May, 1969, to achieve at least 80 percent reduction of total phosphorus by December, 1972, and to control pollution from combined sewers by July, 1977. Enforcement action is and will be taken against municipalities and industries not complying with the timetable.

The following report provides current information on the status of municipal and industrial wastewater treatment and control measures in the Indiana drainage area tributary to Lake Michigan.

MUNICIPAL SEWAGE TREATMENT

Gary, Hammond, Michigan City, and Whiting have engineering reports underway for sewer system and sewage treatment works improvements including tertiary treatment. Michigan City has completed major additions to its activated sludge plant, the Town of Porter is discharging its sewage to the Town of Chesterton for treatment, and East Gary and the Independence Hill Conservancy District have signed agreements which provide for sewage from these municipalities to be treated by the Gary Sanitary District. The Towns of Albion and Wakarusa have completed sewage works projects. The City of East Chicago recently placed a $17 million project under construction which includes improvements to the treatment facilities and major improvements to the sewer system. The sewer project includes sewer separation in some areas and interceptor and lift station improvements which will abate the discharge of industrial wastes to the Indiana Harbor Canal and reduce the overflow from existing combined sewer outfalls.

An enforcement hearing has been held on the City of Whiting and a hearing is scheduled with the City of Hammond for April 7, 1970, relative to projects for control of combined sewer overflows and disinfection of storm water discharges to Lake Michigan. The City of Hammond has completed plans for corrective works but construction has not been undertaken. The Hammond hearing will also include the requirement for major plant improvements.

The municipalities of Bristol, Elkhart, Independence Hill Conservancy District, Lagrange, Ligonier, Middlebury, Portage, and South Bend have submitted final plans for sewage treatment projects. The projects at Elkhart, Lagrange, Ligonier, and South Bend are for improvements to existing facilities. East Gary, Topeka, and Valparaiso have filed preliminary reports for treatment facilities. The East Gary project is for a lift station and connection to a Gary sewer leading to the main treatment plant and the Valparaiso project is for additions to its activated sludge plant. The total cost of all these projects is $23 million. These municipalities have also filed applications for construction grants requesting total Federal grant funds of $7.4 million. The Elkhart and Portage projects which include phosphorus removal, the Wolcottville project, and the chlorination project for Lagrange have recently been certified for Federal construction grants totaling $3,501,350 and will receive State matching grants totaling $1,750,675. The other projects have been stalled for some time because sufficient Federal grant funds have not been available.

The City of Portage, which does not have a sanitary sewer system, is the only City in the Lake, Porter, and LaPorte County area tributary to Lake Michigan that does not have sewage treatment facilities. Construction of a new sanitary sewer system and wastewater treatment facilities for the City of Portage, including phosphorus removal, should be underway within the next few months.

The Towns of Cromwell, Milford Junction, and Topeka, with a total population (1960 census) of 2,218 are the only municipalities in the St. Joseph River subbasin, with at least a partial sewer system, that do not have sewage treatment facilities. These Towns are to provide sewage works by 1972.

The status of municipal wastewater treatment facilities is shown in Appendix I.

Increased surveillance of wastewater treatment facilities continues to improve operation and maintenance activities. Implementation of the Mandatory Certification Act for operators in responsible charge of wastewater treatment facilities has provided better local supervision of treatment facilities. This Act was effective July 1, 1968.

Increased emphasis is being placed on the requirement for semi-public installations to make connections to area-wide sewage facilities. For example, five subdivisions in the Merrillville Conservancy District area have made connections to the Merrillville sewer system. This system discharges to the Gary sewer system for treatment at the Gary Sanitary District plant.

Continued progress has been made on construction of waste treatment facilities at Indiana industries. A total of 14 projects at 7 industries have been completed since the Second Session of the Conference on February 25, 1969. A total of 29 projects have been completed since the First Session of the Conference on January 31, 1968.

Four projects were completed at the steel mills during late December, 1969, and the first quarter of 1970. The central wastewater treatment plant for the Tin Mills and Cold Reduced Sheet Mill at Youngstown Sheet and Tube Company, East Chicago, was not completed until March, 1970, because of late delivery of equipment. The facilities were originally scheduled for completion by December 31, 1969. The additional settling tanks for the Blast Furnace flue dust wastewater at the U. S. Steel Corporation, Gary Works East, Gary, were installed in January, 1970; however, problems with pumps and sludge removal equipment have prevented satisfactory operation of the additional settling tank facilities. The existing flue dust settling pond remains in service. The pumps in the Central Mills lift station must be modified to convey all wastes to the Hot Mill treatment facilities. These facilities were originally scheduled for completion by December 31, 1969. Enforcement action will be taken against U. S. Steel Corporation in the immediate future to obtain additional treatment. Four projects remain to be completed at the Indiana steel mills. These are the Blast Furnace recirculation system and North Terminal Lagoon at Youngstown Sheet and Tube Mill, the Terminal Treatment Plant at Inland Steel Company and the Blast Furnace flue dust settling facilities at U. S. Steel Corporation.

Action in Lake County Circuit Court against Adolph Plating, Inc., East Chicago, resulted in an order to install treatment facilities. The industry elected to close the plant rather than provide waste treatment facilities.

American Oil Company, Whiting; Atlantic-Richfield Company (formerly Sinclair Oil Company) and Cities Service Oil Company, East Chicago, have steps underway to install advanced waste treatment facilities for additional treatment of the wastewaters. The additions will be completed by December 31, 1970, August 1, 1970, and July 1, 1971, respectively. The Indiana oil refineries met commitments to the Conference on Pollution of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and Tributaries (Indiana - Illinois). The additional treatment is to further reduce BOD, oil and threshold odor substances.

Seven industries in the St. Joseph River Basin do not have adequate wastewater treatment or control facilities. Enforcement action is planned against General Products Division, American Motors Corporation (formerly Kaiser Jeep Corporation), South Bend; Gentner Packing Company, South Bend; Middlebury Co-operative Creamery Company, Middlebury; and Angola Reduction Company, Angola, to obtain additional waste treatment. Lehman Veal and Poultry Packers, Wakarusa, will connect wastewaters to the Wakarusa sewage system when the Wakarusa treatment facilities are completed. Continental Can Company, Elkhart, will discharge the effluent from its industrial wastewater treatment plant to the Elkhart sewerage system when secondary treatment is added by the City. The Pennsylvania New York Central Transportation Company, Elkhart, will be required to provide additional treatment as soon as possible under action requested by the Board of the Indiana Attorney General for enforcement of the Board's order dated

August 24, 1968. The Company invested $25,000 for enlargement of the oil pond and improved oil skimming equipment during the summer of 1969; however, additional treatment is needed. To date the Attorney General has not filed an action in this case.

A listing of industrial plants appears in Appendix II. The listing of projects completed since February, 1969, and the time schedules for construction of wastewater treatment facilities appear in Appendix III. These Appendices are up-dated copies of the material submitted to the Federal Water Pollution Control Administration to comply with Recommendation No. 3, Summary of Conference (First Session) Pollution of Lake Michigan and its Tributary Basin (Wisconsin - Michigan - Indiana - Illinois).

STATUS OF IMPLEMENTATION OF RECOMMENDATIONS OF CONFEREES

The following numbered paragraphs provide current information, on the status of implementation of Recommendations of the Conferees, for the items to be undertaken by the state regulatory agencies.

1. Municipalities to achieve at least 80 percent reduction of total phosphorus by December, 1972.

   Municipalities with a population of approximately 2,000 and above have been notified of the requirement for at least 80 percent reduction of total phosphorus. Plans for new wastewater treatment plants or major improvements to existing plants are not approved by the Board unless facilities for phosphorus removal are included or approval is conditioned on the provision of such facilities. Portage and Elkhart have included phosphorus removal in planned sewage works projects. East Chicago's research project for advanced waste treatment includes studies of phosphorus removal, Kendallville's preliminary engineering report on sewage works improvements includes phosphorus removal and Gary has retained consulting engineers for recommendations for plant improvements including advanced waste treatment and phosphorus removal.

2. Industries to provide adequate treatment by December, 1972.

   Indiana industries listed in the Implementation Plans of the Water Quality Standards are scheduled to provide adequate treatment substantially before December, 1972.

3. Submission of lists of discharges to the Lake Michigan Basin.

Lists of Indiana municipalities and industries discharging wastewater to the Lake Michigan Basin were submitted to the Conferees on October 30, 1968. Copies of the lists, which have been updated to reflect current conditions, are appended.

4. Continuous disinfection of all municipal waste treatment plant effluents by May, 1969.

All municipalities in Lake, LaPorte, and Porter Counties with effluent discharge to the basin have effluent chlorination facilities and are providing continuous disinfection throughout the year.

Municipalities in the St. Joseph River Drainage Basin have been notified of the requirement; however, South Bend, Lagrange, Ligonier, Goshen, and Ashley do not have adequate effluent chlorination facilities in operation or under construction. The City of South Bend is under order of the Stream Pollution Control Board to provide effluent chlorination. The City has appealed the Board's order and the case is set for hearing in the Starke County Circuit Court on April 17, 1970. All of these communities, except Ashley and Goshen, have filed applications for Federal grants under PL 660; however, only Lagrange has been certified for a priority because sufficient grant funds have not been available to reach the other municipalities. Goshen has facilities for effluent chlorination; however, adequate contact time is not provided.

5. Unified collection systems serving contiguous urban areas are to be encouraged.

In accordance with a recommendation of the Stream Pollution Control Board, the City of East Gary signed an agreement with the Gary Sanitary District for connection of its sewage collection system to the Gary system rather than continuing to utilize a separate treatment facility, and the Town of Porter is discharging its sewage to the Chesterton sewage treatment plant.

6. Provision of adjustable overflow regulating devices on existing combined sewer systems by December, 1970.

Detailed information has not been tabulated on the extent of the problem relative to overflow regulating devices; however, municipalities have been notified of this requirement. Gary has increased the interception of flow above dry weather flow on an average of approximately 10 mgd; in addition, consulting engineers have about completed the master plan for sewer improvements. This program will receive increased attention in the near future.

7. Separation of combined sewers in urban renewal projects; control of pollution by July, 1977.

The Board's policy requires that sewer construction within a redevelopment area must provide separate storm water and sanitary waste systems. It is also the policy of the Board not to approve combined sewers in new developments. It is anticipated that major pollution from combined sewer overflows will be controlled by July, 1977. The City of East Chicago has construction underway for extensive sewer separation to serve a large urban renewal area and adjacent areas and a demonstration project, partially financed by a Federal Water Pollution Control Administration grant, to treat combined sewer overflows from approximately one-third of the City area. South Bend and Mishawaka have also undertaken sewer separation in urban renewal areas. Michigan City is completing construction of storm sewers to provide separation in approximately two-thirds of its area.

8. Discharge of treatable industrial wastes to municipal sewers is encouraged.

Municipalities are requested to establish and implement adequate sewer use ordinances to control industrial waste discharges to sewerage systems and are encouraged to accept industrial wastes amenable to treatment.

9. Disinfection of industrial wastes containing pathogenic organisms.

Inspections have been made on industrial waste outfalls that were suspected of containing sanitary sewage. No outlets have been found that require disinfection.

11. Prohibition of dumping of polluted material into Lake Michigan.

The Board has reaffirmed its opposition and does not approve the dumping of harbor dredgings in Lake Michigan. Indiana industries are providing disposal sites for dredgings adjacent to their properties.

12. Alewife disposal.

A plan is being developed to collect the anticipated 1970 die-off of alewives and transport them to on-shore disposal sites. An area is available on Bethlehem Steel Corporation property for disposal of alewives netted adjacent to Indiana.

13. Control of wastes from watercraft.

The 1969 Indiana General Assembly amended a 1957 Act concerning the operation of watercraft to remove the exclusion of Lake Michigan waters, and now prohibits the discharge of sewage from boats to all waters of the State, including Lake Michigan. The amendment also provides for the use of holding tanks, incinerators, or treatment systems which are approved by the Board. The effective date is January 1, 1971; however, the Board has initiated a program of voluntary compliance for the 1970 boating season.

14. Maximum use of area-wide sewage facilities.

In addition to the situation mentioned in Item 5, other contiguous urbanized areas are encouraged to use area-wide sewage facilities. The Merrillville Conservancy District in Lake County is now serving 2,575 homes with discharge to the Gary Sanitary District for treatment. A proposed sanitary sewer system to serve the Independence Hill Conservancy District will also connect to Merrillville Conservancy District sewers. A private utility near South Bend is serving homes and commercial facilities that formerly were served by small treatment plants and septic tank absorption systems. Sewage and wastes are discharged to the South Bend sewage treatment plant.

15. Evaluation of the pesticide problem.

A program to monitor pesticides in streams tributary to Lake Michigan was initiated in June, 1969, and continued through October. Water samples were collected and analyzed monthly from stations located on the Indiana Harbor Canal, Burns Ditch, Trail Creek, and the St. Joseph River near South Bend and near Bristol. In addition, clams were placed in the stream at each of the above stations and collected a month later for analysis for pesticide concentrations.

A Federal Water Pollution Control Administration Research, Development, and Demonstration grant of $39,997 will permit the expansion of the pesticide monitoring program in 1970. The program will include additional sampling and analysis, and a detailed survey of the basin to determine the use of various pesticides.

A pesticide council has been appointed by the Governor to report on pesticide monitoring, legislation, and the impact of pesticides in the aquatic environment.

18. Inventory of potential for major spills of other hazardous material.

The inventory of sites where potential exists for major spills of oil and other hazardous material was submitted to the Conferees on October 30, 1968. The oil industry in the Indiana Harbor Ship Canal area established an oil contingency plan in 1966 to provide control and clean up of spills of oil in the area. Early in 1970 the Board initiated steps to expand the Indiana Harbor Ship Canal plan to include all the major industries in the area and to encompass other hazardous materials. Work is underway on development of similar contingency plans for the Burns Ditch-Burns Waterway Harbor and the Michigan City Harbor areas. A contingency plan is being prepared for the entire State.

19. Arrangement for a broad spectrum of water quality analysis at water plant intakes.

Water quality analyses are being performed at the Gary-Hobart (West) and Michigan City filtration plants to conform with recommendations of the Conferees with the following exceptions:

a. Samples are not being analyzed for silica and zooplankton.

b. Those parameters for which twice-weekly sampling is recommended are being accomplished, except that planktonic algae samples at Michigan City are collected and analyzed twice-monthly by Indiana State Board of Health personnel.

Copies of laboratory results have been submitted monthly to the Federal Water Pollution Control Administration, Ohio Basin Regional Office, for inclusion in STORET. Printouts will be available on an annual basis or more frequent if desired.

APPENDIX I

Municipal Waste
Lake Michigan Basin
Lake, Porter, and LaPorte Counties

Municipality	Population 1960 (or Later Census)	Type of Treatment	Year Completed	Design Flow mgd	Present Flow mgd	Receiving Stream	Improvements Required (1)	Time-Table	Remarks
Chesterton	4,355	Activated sludge, chlorination	1963	1.50	1.06	Little Calumet R., Burns Ditch	Phosphorus removal	1972	-
Crown Point	8,443	Activated sludge, chlorination	1966*	1.80	0.90	Beaver Dam Ditch Deep River Burns Ditch	Phosphorus removal,	1972	Under Study
							Advanced waste treatment	1977	
East Chicago	57,669	Activated sludge, chlorination	1960*	20.00	14.00	Grand Calumet R., Indiana Harbor	Advanced waste treatment,	As soon as practicable	0.75 mgd - Pilot studies underway with Federal grant.
							Phosphorus removal	1972	-
							Storm water disinfection and control	As soon as practicable	Demonstration project underway with Federal grant.
East Gary	9,309	Trickling filter, chlorination	1960*	1.30	1.00	Burns Ditch	-	-	Contract signed for connection to Gary. Applications on file for construction grants.
Gary	178,320	Activated sludge, chlorination	1965*	60.00 +20.00 Additional primary capacity	42.50	Grand Calumet R., Indiana Harbor	Advanced waste treatment	As soon as practicable	Preliminary engineering report about complete.
							Phosphorus removal	1972	-
							Storm water disinfection and control	As soon as practicable	Preliminary engineering report about complete

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*Last major improvement

APPENDIX I

Municipal Waste
Lake Michigan Basin
Lake, Porter, and LaPorte Counties (continued)

Municipality	Population 1960 (or Later Census)	Type of Treatment	Year Completed	Design Flow mgd	Present Flow mgd	Receiving Stream	Improvements Required (1)	Time-Table	Remarks
Hammond	111,698	(Treatment required of storm and combined sewer overflows to Lake Michigan)					Disinfection and control	1970	Final plans approved. Scheduled for SPCB hearing.
Whiting	8,137	(Treatment required of storm and combined sewer overflows to Lake Michigan)					Disinfection and control	1970	Preliminary report underway. SPCB enforcement hearing 2-10-70
Hobart	18,680	Activated sludge, chlorination	1962*	2.00	1.30	Deep River, Burns Ditch	Phosphorus removal	1972	
							Advanced waste treatment	1977	Under Study
Michigan City	36,653	Activated sludge, chlorination	1968*	15.00	12.00	Trail Creek	Advanced waste treatment	As soon as practicable	Under Study
							phosphorus removal	1972	
Portage	16,490	None	-	-	-	Burns Ditch	Treatment and chlorination	1970	Plans approved. Certified fc construction grant 2-70. Prc ject includes phosphorus removal.
Porter	2,189	Connected to Chesterton	-	-	-	Calumet River Burns Ditch	-	-	-
Valparaiso	15,227	Activated sludge, chlorination	1954	2.00	2.35	Salt Creek, Little Calumet, Burns Ditch	Expansion,	1972	Preliminary study underway. Applications on file for construction grants.
							Phosphorus removal,	1972	
							Advanced waste treatment	1977	-

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(1) 80 percent phosphorus reduction required of municipalities by 1972 (excluding Hammond and Whiting).

* Last major improvement

APPENDIX I

Municipal Wastewater Treatment
Lake Michigan Basin - St. Joseph River

Municipality	Population 1960 (or) Later Census)	Type of Treatment	Year Completed	Design Flow mgd	Present Flow mgd	Receiving Stream	Improvements Required	Time-Table	Remarks
Albion	1,325	Lagoon, Chlorination	1968	0.15	0.08 (est.)	Tributary to Elkhart River	-	-	-
Angola	4,746	Trickling filter, chlorination	1963*	0.85	0.80	Pigeon Creek, Pigeon River	Phosphorus removal Advanced waste treatment	As soon as practicable 1977	Under consideration. -
Ashley	721	Activated sludge, 7-day terminal lagoon	1966	0.08	0.05	Tributary to Turkey Creek, Pigeon River	Chlorination	1969	-
Cromwell	451	None	-	-	-	Turkey Creek, Elkhart River	Secondary treatment and chlorination	1972	-
Elkhart	40,274	Primary, chlorination	1955	12.0	12.0 to 15.00	St. Joseph R.	Expansion and secondary treatment, Phosphorus removal	1969 1972	Plans approved. Certified for construction grants 2-70. Project includes phosphorus removal.
Fremont	937	Trickling filter, chlorination	1958	0.15	0.12	Tributary to Crooked Creek, Fawn River	-	-	-

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* Last major improvement

APPENDIX I

Municipal Wastewater Treatment
Lake Michigan Basin - St. Joseph River (continued)

Municipality	Population 1960 (or Later Census)	Type of Treatment	Year Completed	Design Flow mgd	Present Flow mgd	Receiving Stream	Improvements Required	Time-Table	Remarks
Goshen	13,718	Activated sludge, limited chlorination	1963*	3.50	2.40	Elkhart River	Chlorination and phosphorus removal	1972	Engineer employed
Kendallville	6,765	Trickling filter chlorination	1958*	1.44	1.65	Henderson Lake North Branch Elkhart River	Expansion, Phosphorus removal	As soon as practicable	Under SPCB order. Engineer employed
Lagrange	1,990	Trickling filter	1958	0.38	0.19	Fly Creek Pigeon River	Chlorination,	1969	Certified for construction grants 2-70.
							Phosphorus removal	1972	-
Ligonier	2,595	Primary	1941	0.20	0.25	Elkhart River	Expansion and secondary treatment, including phosphorus removal	1972	Plans approved. Applications on file for construction grants.
Milford Junction	1,167	None	-	-	-	Turkey Creek, Elkhart River	Secondary treatment and chlorination	1972	Plans approved.
Mishawaka	33,361	Activated sludge, chlorination	1952 1966*	8.30	9.00(1)	St. Joseph R.	Expansion and phosphorus removal	1972	Under study
Nappanee	3,895	Activated sludge, chlorination	1963	0.90	0.70	Tributary Turkey Creek, Elkhart River	Phosphorus removal	1972	-
South Bend	132,445	Activated sludge	1955	24.0(Sec) 24.0(Prim)	32.00(1)	St. Joseph R.	Chlorination	As soon as practicable	Plans approved
							Expansion, Phosphorus removal	1972 1972	Plans submitted. Applications on file for construction grants.

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(1) All dry weather flow is receiving secondary treatment.
* Last major improvement.

APPENDIX I

Municipal Wastewater Treatment
Lake Michigan Basin - St. Joseph River (continued)

Municipality	Population 1960 (or Later Census)	Type of Treatment	Year Completed	Design Flow mgd	Present Flow mgd	Receiving Stream	Improvements Required	Time-Table	Remarks
Syracuse	1,595	Trickling filter, chlorination	1962	0.25	0.20	Turkey Creek, Elkhart River	-	-	-
Topeka	600	None	-	-	-	Little Elkhart R.	Secondary treatment and chlorination	1972	-
Wakarusa	1,145	Lagoon, chlorination	1970	-	-	Baugo Creek Elkhart River	-	-	-

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(1) All dry weather flow is receiving secondary treatment.
* Last major improvement

APPENDIX II

INDUSTRIAL WASTE TREATMENT CONTROL FACILITIES
LAKE MICHIGAN BASIN

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
St. Joseph River					
Angola Reduction Company Angola	Septic tank - absorption system	Grease separation basin and septic tank	I	0.010	Silver Lake
Weatherhead Company Angola	Angola Sewer	Oil separation, ion exchange with water reuse, cyanide destruction, chromium reduction and cyanide isolation facilities	A	0.175	Tributary of Crooked Lake
Bristol Band Instrument Company Bristol	Septic tank - absorption system	Cyanide isolation and soil absorption	A	0.010	None
Continental Can Company Elkhart	Elkhart sewer	Bar screens, chemical treatment and clarification	I	4.0	Elkhart River
Elkhart Packing Company Elkhart	Septic tank - absorption system	Grease separation, blood collection and soil absorption pond	A	0.040	None
Pennsylvania New York Central Transportation Company Elkhart	Elkhart sewer	Oil separation and soil absorption ponds	I	0.050	Honey Creek
John L. Whisler and Son, Inc. Elkhart	Septic tank - absorption system	Fine screens, blood collection, grease separation and soil absorption ponds	A	0.150	None

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Penn Electric Switch Company Goshen	Goshen sewer	Cyanide isolation and settling tank	A	0.225	Goshen sewer
Pine Manor, Inc. Goshen	Goshen sewer	Grease separation, blood collection and soil absorption pond	A	0.040	None
Kendallville Fertilizer Company Kendallville	Septic tank - absorption system	Septic tanks and waste stabilization pond	A	0.020	Henderson Creek
Springer Corporation Ligonier	Septic tank - absorption system	Oil separation tank	A	0.015	Elkhart River
Middlebury Co-operative Creamery, Inc. Middlebury	Septic tank - absorption system	Septic tanks and broad irrigation	I	0.025	Little Elkhart
Cecil Foods, Inc. Milford	Septic tank - absorption system	Soil absorption pond	A	0.020	None
Maple Leaf Farm Processing Plant Milford	Septic tank - absorption system	Waste stabilization pond	A	0.080	Waubee Lake
Indiana-Michigan Electric Company Twin Branch Station Mishawaka	Septic tank - absorption system	Ash settling ponds	A	84.0	St. Joseph River
U. S. Rubber Company Mishawaka	Mishawaka sewer	In-plant control, primary clarification, chemical treatment, flocculation, clarification and vacuum filtration	A	1.300	St. Joseph River
Animal By-Products Corporation New Carlisle	Septic tank - absorption system	Soil absorption pond	A	0.020	None

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
New Paris Creamery Company New Paris	Septic tank - absorption system	Aerated lagoon	A	0.225	Turkey Creek
Polo Produce, Inc. New Paris	Septic tank - absorption system	Fine screens, blood collection, grease separation and soil absorption pond	A	0.050	None
County Line Cheese Company Shipshewana	Septic tank - absorption system	Ridge and Furrow irrigation	A	0.015	None
General Products Division, AMC (fornerly Kaiser Jeep Corporation) South Bend	Septic tank - absorption system	None	I	0.020	Bowman Creek
Gentner Packing Company South Bend	Septic tank - absorption system	Blood collection, grease separation and anaerobic-aerobic waste stabilization pond system	I	0.215	Autin Ditch
Weatherhead Company Syracuse	Syracuse sewer	Cyanide destruction and cyanide isolation	A	0.225	Turkey Creek
Lehman Veal and Poultry Packers Wakarusa	None	None	I	0.030	Bouga Creek
Grand Calumet River - Indiana Harbor Ship Canal - Lake Michigan					
Northern Indiana Public Service Co. Bailly Station Baileytown	Septic tank - absorption system - no discharge	Ash disposal with soil absorption of sluicing water - no discharge	A	--	Lake Michigan
American Steel Foundries Company East Chicago	East Chicago Sanitary District	Settling basin	A	.500	Indiana Harbor Ship Canal
Blaw Knox Company East Chicago	East Chicago Sanitary District	Settling tank and filter	A	.425	Indiana Harbor Ship Canal

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Cities Service Oil Company East Chicago	East Chicago Sanitary District	Oil separation tanks, ammonia-sulfide strippers and separate disposal of waste caustic and acids	**	73	Grand Calumet River
E. I. du Pont de Nemours & Co., Inc. East Chicago	East Chicago Sanitary District	Acid neutralization facilities, settling basin and controlled discharge	A	9.60	Grand Calumet River
Inland Steel Company East Chicago	Three trickling filter plants with effluent chlorination	Coke plant cooling water recirculation, phenol extraction, napthalene recovery and discharge of ammonia still wastes to East Chicago Sanitary District. Sewers, scale pits, oil separator, flue dust thickeners, chemical clarification facilities and deep well disposal system for waste pickle liquor	I	900.00	Indiana Harbor Ship Canal and Lake Michigan
M & T Chemicals Company East Chicago	East Chicago Sanitary District	Spent caustic sold for recovery and settling pond	A	.075	East Chicago sewer system
Mobil Oil Company East Chicago	East Chicago Sanitary District	Oil separators, ammonia sulfide stripper, in-plant control, ballast tank oil separator, separate disposal of waste caustics and acids, air flotation and water reuse	*	2.50	Indiana Harbor Ship Canal

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Atlantic-Richfield Company (formerly Sinclair Refining Company) East Chicago	East Chicago Sanitary District	Oil separators, ammonia sulfide stripper, in-plant control, ballast tank oil separator and separate disposal of waste caustics and acids	**	5.50	Indiana Harbor Ship Canal
U. S. Gypsum Company East Chicago	East Chicago Sanitary District	Settling basin and save-all clarifiers	A	4.50	Indiana Harbor Ship Canal
Union Carbide Chemical Corporation Linde Air Division East Chicago	East Chicago Sanitary District	Settling ponds and oil separation	A	.250	Indiana Harbor Ship Canal
Youngstown Sheet and Tube Company East Chicago	East Chicago Sanitary District	Scale pits, oil separators, settling basins, phenol extraction, napthalene recovery, lime still waste to East Chicago sewers, sand filtration, chemical treatment and waste pickle liquor neutralization on hot slag	I	250.00	Indiana Harbor Ship Canal and Lake Michigan
Vulcan Materials Company Gary	Septic tank - absorption system	Spent caustic sold for recovery	A	--	Grand Calumet River
American Maize-Products Company Hammond	Hammond Sanitary District	In-plant control, anaerobic lagoon, aerated lagoon, starch filtrate clarifiers, chlorination and some waste discharged to Hammond sewers	A	14.00	Lake Michigan
Commonwealth Edison Co., Inc. Hammond	Chicago Sanitary District	Fly ash settling bins and bottom ash settling basins	A	1000.00	Lake Michigan

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
American Oil Company Whiting	Whiting sewers	Oil separators and aerated lagoon	**	140.00	Lake Michigan
Union Carbide Chemical Corporation Chemicals Division Whiting	Whiting sewers and East Chicago Sanitary District	Oil separators, settling basins and in-plant control	*	54.00	Lake Michigan and Indiana Harbor Ship Canal
Union Tank Car Company Whiting	Hammond Sanitary District	Oil separation and discharge to the Hammond Sanitary District	A	.030	Hammond sewerage system
American Bridge Division U. S. Steel Corporation Gary	Gary Sanitary District	None	A	--	Grand Calumet River
Gary Works West (formerly Gary Sheet and Tin Mill) U. S. Steel Corporation Gary	Gary Sanitary District	Scale pits, oil separators, deep well, sand filtration and chemical treatment	I	63.00	Grand Calumet River - Lake Michigan
Gary Works East (formerly Gary Steel Works) U. S. Steel Corporation Gary	Gary Sanitary District	Scale pits, flue dust thickeners, settling basins and discharge of portion of coke plant wastes to Gary Sanitary District	I	370.00	Grand Calumet River
Gary Works East (formerly National Tube Division) U. S. Steel Corporation Gary	Gary Sanitary District	Scale pits, oil separation and acid collection	A	41.0	Grand Calumet River
Northern Indiana Public Service Co. Mitchell Station Gary	Septic tank - subsurface sand	Fly ash and bottom ash settling ponds	A	440.00	Lake Michigan

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Steiner Tissue Division Georgia-Pacific Corporation Gary	Gary Sanitary District	Clarifiers	A	1.00	Gary sewer
Universal Atlas Cement Company U. S. Steel Corporation Gary	Trickling filter	Oil separation	A	12.00	Lake Michigan
Little Calumet River - Burns Ditch - Lake Michigan					
Bethlehem Steel Corporation Burns Harbor Plant Chesterton	Activated sludge, chlorination and discharge to terminal lagoon	Scale pits, chemical flocculation-clarification units, oil separators, acid neutralization, deep well disposal system, cyanide isolation facilities, water reuse and cyanide treatment	A	130.00	Little Calumet River
American Chemicals Company Griffith	Septic tank - absorption system	Incineration and waste holding lagoon	A	--	Tributary Turkey Creek
Great Lakes Dressing Plant Michigan City	Septic tank - absorption system	Waste absorption pond	A	--	Trail Creek
American Cyanamid Company Michigan City	Septic tank - absorption system	Settling basins and deep well disposal system	A	--	Trail Creek
Northern Indiana Public Service Co. Michigan City	Septic tank - absorption system	Ash settling ponds	A	--	Lake Michigan
Phillips Drill Company Michigan City	Septic tank - absorption system	Oil separator	A	.025	Trail Creek
Royal Metal Corporation Michigan City	Activated sludge	Ion exchange, settling tank and settling lagoon	A	.040	Trail Creek

APPENDIX II (continued)

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Midwest Steel Division National Steel Corporation Portage	Activated sludge with chlorination	Cyanide isolation facilities, chemical treatment with clarification and deep well disposal system	A	4.5	Burns Ditch
Vale City Packing Company Valparaiso	Septic tank - absorption system	Septic tank and absorption system	A	.015	None
Indiana General Corporation Valparaiso	Septic tank - absorption system	Absorption pond and deep well	A	.030	None
Little Calumet River (West)					
Simmons Company Munster	Hammond Sanitary District	Cyanide destruction and chromium reduction	A	--	Little Calumet River
Grand Calumet River (West)					
Adolph Plating, Inc. East Chicago			Plant Closed		
LeSalle Steel Company Hammond	Hammond Sanitary District	Acid neutralization and clarification	A	--	Grand Calumet River and Hammond sewerage system
Wolf Lake					
Lever Brothers Company Hammond	Hammond Sanitary District	In-plant control, air flotation, effluent chlorination and discharge of some waste to Hammond Sanitary District	***	9.7	Wolf Lake

A Adequate
I Inadequate
* Will be required to provide additional control of threshold odor substances if studies show the need.
** Are providing advanced waste treatment over and above the requirements of the Federal Conference (Indiana - Illinois).
***Complies with water quality criteria at the control points on Wolf Lake but additional work is needed to improve conditions in Wolf Lake Channel

APPENDIX III

INDUSTRIAL WASTE TREATMENT AND CONTROL FACILITIES
PROJECTS COMPLETED AFTER FEBRUARY, 1969, and TIMETABLE FOR FUTURE COMPLETION

Industry and Location	Significant Contaminant	Project Planned	Established Completion Date
Angola Reduction Company Angola	BOD, grease and suspended solids	Plans being prepared	December 31, 1969 (enforcement action proposed)
Continental Can Company Elkhart	BOD and suspended solids	Connection to Elkhart sewerage system	Pending construction of municipal secondary system
Pennsylvania New York Central Transportation Company Elkhart	BOD, oil and suspended solids	Plans being prepared	June 1, 1969 (under enforcement action)
Penn Electric Switch Company Goshen	Cyanide and heavy metals	Connection to Goshen sewerage system	Completed 1969
Middlebury Co-operative Creamery, Inc. Middlebury	BOD and suspended solids	--	December 31, 1969 (enforcement action proposed)
Gentner Packing Company South Bend	BOD and suspended solids	--	December 31, 1969 (enforcement action proposed)
General Products Division, AMC (formerly Kaiser Jeep, Inc.) South Bend	Zinc and phosphate	Plans being prepared	December 31, 1969 (enforcement action proposed)
Lehman Veal and Poultry Packers Wakarusa	BOD, grease and suspended solids	Plan connection to municipal treatment system when constructed	Pending completion of municipal system

APPENDIX III (continued)

Industry and Location	Significant Contaminant	Project Planned	Established Completion Date
Youngstown Sheet & Tube Company East Chicago	Acidity, suspended solids, oils and iron	No. 2 Cold Reduced Sheet Mill - Sumps, pumps and sewers to collect waste pickle liquor and sumps, pumps and sewers to collect oily wastes	Completed 1969
Youngstown Sheet & Tube Company East Chicago	Cyanide, oils and suspended solids	Blast Furnace - Sewers, sumps and pumps to collect and recirculate all clarified waste from the Blast Furnace. No discharge to receiving stream	June 30, 1970
Youngstown Sheet & Tube Company East Chicago	Oils and suspended solids	North Lagoon - A settling lagoon to collect treated wastes from the No. 5 Stand of the Tandem Rolling Mill, Sewer No. 23 and the No. 3 Hot Strip Mill. All effluent from the lagoon will be recirculated. No discharge to receiving stream.	June 30, 1970
American Maize-Products Company Hammond	BOD and suspended solids	Additional aeration capacity for lagoon system water reuse and other in-plant controls	Completed 1969
American Oil Company Whiting	BOD, oil, suspended solids and threshold odor substances	Advanced waste treatment for process water	December 31, 1970

Appendix III (continued)

Industry and Location	Significant Contaminant	Project Planned	Established Completion Date
Cities Service Oil Company East Chicago	BOD, oil and threshold odor substances	Advanced waste treatment	July 1, 1971
Inland Steel Company East Chicago	Oils and suspended solids	12-inch Merchant Mill waste treatment plant	Completed 1969
Inland Steel Company East Chicago	Oils, suspended solids and iron	Terminal settling and oil skimming basin	May 1, 1970
Mobil Oil Company East Chicago	BOD, oil, suspended solids and threshold odor substances	Air flotation and water reuse	Completed 1969
Atlantic-Richfield Company (formerly Sinclair Refining Company) East Chicago	BOD, oil, suspended solids and threshold odor substances	Advanced waste treatment	August 1, 1970
Youngstown Sheet & Tube Company East Chicago	Oil and suspended solids	Buttweld Mill - Pressure filters for solids removal	Completed 1969
Youngstown Sheet & Tube Company East Chicago	Oils and suspended solids	No. 1 Tin Mill, No. 2 Cold Reduced Sheet Mill - Central water treatment plant for chemical treatment of oils and suspended solids	Completed March, 1970
Youngstown Sheet & Tube Company East Chicago	Oils and suspended solids	Hot Rolling Mills - Terminal lagoon for secondary clarification of effluent from Lake front scale pit	Completed 1969

APPENDIX III (continued)

Industry and Location	Significant Contaminant	Project Planned	Established Completion Date
Gary Sheet & Tin Mill U. S. Steel Corporation Gary	Iron, suspended solids, free oils, emulsified oils and BOD	Segregated wastewater from Tin Mill will be discharged to the existing 6-Stand Tandem Cold Reduction Mill waste treatment plant	Completed 1969
Gary Sheet & Tin Mill U. S. Steel Corporation Gary	Iron, suspended solids, free oils, emulsified oils and BOD	Segregated wastewater from Sheet Mill will be discharged to the expanded 6-Stand Tandem Cold Reduction Mill waste treatment facilities	Completed 1969
Gary Sheet & Tin Mill U. S. Steel Corporation Gary	Iron, suspended solids and oils	Wastewater from the 80-inch Hot Strip Mill scale pits will be diverted to the expanded 84-inch Hot Strip Mill Filtration Plant	Completed March, 1970
Gary Steel Works U. S. Steel Corporation Gary	Oils and suspended solids	Blast Furnace Area - Additional settling basins for flue dust, oil separators in power station and waste segregation	Completed January, 1970
Gary Steel Works U. S. Steel Corporation Gary	Oil and suspended solids	Steel Making Area - Construction of oil separators and segregation of wastewater with discharge to Blast Furnace Area flue dust settling basins	Completed 1969

APPENDIX III (continued)

Industry and Location	Significant Contaminant	Project Planned	Established Completion Date
Gary Steel Works U. S. Steel Corporation Gary	Oil and suspended solids	Hot Mills Area - Construction of sewers, pumps, sumps, piping and settling and oil skimming basins	Completed 1969
Steiner Tissue Division Georgia-Pacific Corporation Gary	BOD, oil and suspended solids	Chemical pretreatment and clarification facilities and discharge to the Gary Sanitary District sewerage system	Completed 1969
Adolph Plating, Inc. East Chicago	Oil, cyanide and heavy metals	Oil separation, cyanide destruction and clarification	Plant closed 1969
Lever Brothers Company Hammond	BOD, oils and suspended solids	Scrub-vactor on fatty acid still	Completed 1969

MR. MILLER: Gary, Hammond, Michigan City and Whiting have engineering reports under way for sewer system and sewage treatment works improvements including tertiary treatment. Michigan City has completed major additions to its activated sludge plant, the town of Porter is discharging its sewage to the town of Chesterton for treatment, and East Gary and the Independence Hill Conservancy District have signed agreements which provide for sewage from these municipalities to be treated by the Gary Sanitary District. The towns of Albion and Wakarusa have completed sewage works projects. The city of East Chicago recently placed a $17 million project under construction which includes improvements to the treatment facilities and major improvements to the sewer system. The sewer project includes sewer separation in some areas and interceptor and lift station improvements which will abate the discharge of industrial wastes to the Indiana Harbor Canal and reduce the overflow from existing combined sewer outfalls.

An enforcement hearing has been held on the city of Whiting and a hearing is scheduled with the city of Hammond for April 7, 1970, relative to projects for control of combined sewer overflows and disinfection of storm water discharges to Lake Michigan. The city of Hammond has completed plans for corrective works but construction has not been undertaken. The Hammond hearing will also include the requirement for major plant improvements.

The municipalities of Bristol, Elkhart, Independence Hill Conservancy District, Lagrange, Ligonier, Middlebury, Portage, and South Bend have submitted final plans for sewage treatment projects. The projects at Elkhart, Lagrange, Ligonier, and South Bend are for improvements to existing facilities. Easy Gary, Topeka, and Valparaiso have filed preliminary reports for treatment facilities. The East Gary project is for a lift station and connection to a Gary sewer leading to the main treatment plant and the Valparaiso project is for additions to its activated sludge plant. The total cost of all these projects is $23 million. These municipalities have also filed applications for construction grants requesting total Federal grant funds of $7.4 million. The Elkhart and Portage projects, which include phosphorus removal, the Wolcottville project, and the chlorination project for Lagrange have recently been certified for Federal construction grants totaling $3,501,350 and will receive State matching grants totaling $1,750,675. The other projects have been stalled for some time because sufficient Federal grants have not been available.

The city of Portage, which does not have a sanitary sewer system, is the only city in the Lake, Porter, and LaPorte County area tributary to Lake Michigan that does not have sewage treatment facilities. Construction of a new sanitary sewer system and wastewater treatment facilities for the city of Portage, including phosphorus removal, should be under way within the next few months.

The towns of Cromwell, Milford Junction and Topeka, with a total population in the 1960 census of 2,218, are the only municipalities in the St. Joseph River subbasin with at least a partial sewer system that do not have sewage treatment facilities. These towns are to provide sewage works by 1972.

The status of the municipal wastewater treatment facilities is shown in Appendix I.

Increased surveillance of wastewater treatment facilities continues to improve operation and maintenance activities. Implementation of the Mandatory Certification Act for operators in responsible charge of wastewater treatment facilities has provided better local supervision of treatment facilities. This Act was effective July 1, 1968.

Increased emphasis is being placed on the requirement for semi-public installations to make connections to areawide sewage facilities. For example, five subdivisions in the Merrillville Conservancy District area have made connections to the Merrillville sewer system. This system discharges to the Gary sewer system for treatment at the Gary Sanitary District plant.

Continued progress has been made on construction of waste treatment facilities at Indiana industries. A total of 14 projects at 7 industries have been completed since the Second Session of the conference on February 25, 1969. A total of 29 projects have been completed since the First Session of the conference on January 31, 1968.

Four projects were completed at the steel mills during late December 1969 and the first quarter of 1970. The central wastewater treatment plant for the Tin Mills and Cold Reduced Sheet Mill at Youngstown Sheet and Tube

Company, East Chicago, was not completed until March 1970 because of late delivery of equipment. The facilities were originally scheduled for completion by December 31, 1969. The additional settling tanks for the Blast Furnace flue dust wastewater at the U. S. Steel Corporation, Gary Works East, Gary, were installed in January 1970; however, problems with pumps and sludge removal equipment have prevented satisfactory operation of the additional settling tank facilities. The existing flue dust settling pond remains in service. The pumps in the Central Mills lift station must be modified to convey all wastes to the Hot Mill treatment facilities. These facilities were originally scheduled for completion by December 31, 1969. Enforcement action will be taken against U. S. Steel Corporation in the immediate future to obtain additional treatment. Four projects remain to be completed at the Indiana steel mills. These are the Blast Furnace recirculation system and North Terminal Lagoon at Youngstown Sheet and Tube Mill, the Terminal Treatment Plant at Inland Steel Company--and I might say here that Inland Steel notified us that the Terminal Treatment Plant was placed in operation last week, the effluent sewers have been blocked off and that all wastes are now going through the Terminal Treatment works. This is completed at least one month, possibly two months, ahead of schedule.

MR. STEIN: Are you going to have a formal opening?

MR. MILLER: I don't know that they will have a formal opening, but at least all the wastes from this area are going through the treatment works at this time.

MR. STEIN: But they haven't invited us to look at it?

MR. MILLER: No, they haven't invited you to look at it.

MR. STEIN: Thank you.

MR. MILLER: I don't think there is any question that they will.

MR. STEIN: I am not raising a question.

MR. MILLER: --and the Blast Furnace flue dust settling facilities at U. S. Steel Corporation.

Along the same line as your questioning, Mr. Chairman, investigations were made at all the steel companies in January and I would say that it is probably a little early to really ascertain the effectiveness of the treatment works. But we will follow up on this in determining whether or not they are adequate to do the job. But our observations did reveal that in our opinion the facilities for the Blast Furnace flue dust at U. S. Steel Gary East is not adequate and we will recommend to the April meeting of the Stream Pollution Control Board that enforcement action be commenced in this case.

MR. STEIN: Is this the same action you are talking about where you say enforcement action will be taken against U. S. Steel or is that another one?

MR. MILLER: Yes, sir, this is the same one.

MR. STEIN: And the State is going to do that?

MR. MILLER: Yes, sir.

MR. STEIN: Right? Good luck.

MR. MILLER: Action in the Lake County Circuit Court against Adolph Plating, Inc., East Chicago, resulted in an order to install treatment facilities. The industry elected to close the plant rather than provide waste treatment facilities.

MR. POOLE: I believe it moved to Illinois.

MR. STEIN: Yes, sir.

MR. POOLE: Good luck on that pickle liquor, Mr. Stein. (Laughter.)

MR. STEIN: Yes. You know, I am not going to recognize your reports any more without Adolph Plating. Adolph Plating was the defiant plant all the time, and then when Indiana finally brought action against them they just closed and moved out of the State.

MR. MILLER: American Oil Company, Whiting, Atlantic-Richfield Company, which was formerly Sinclair Oil Company, and Cities Service Oil Company, East Chicago, have steps under way to install advanced waste treatment facilities for additional treatment of wastewaters.

I might say that the facilities of American Oil are for air flotation and sedimentation and incineration of some sludges, at Atlantic-Richfield this is an activated sludge-type process with aerobic sludge digestion, and at Cities Service it is extended aeration, final settling and sludge drawing. The effluents from these tertiary treatment plants or advanced treatment plants are, in the order of oils, 5 parts per million or milligrams per liter less and suspended solids 10, with the exception of Cities Service, which says it will be as good as they take it in, and BOD's at Cities Service and Atlantic-Richfield 10 or less and with American Oil less than 20 parts per million. So this should be a decided improvement when these facilities are completed and they are expected to be completed by December 31, 1970, for American Oil, August 1, 1970, Atlantic-Richfield, and July 1971 by Cities Service. The Indiana oil refineries met commitments to the conference on pollution of the Grand Calumet River, Little Calumet River, Calumet River, Lake Michigan, Wolf Lake and tributaries (Indiana - Illinois). The additional treatment is to further reduce BOD, oil and threshold odor substances.

Seven industries in the St. Joseph River Basin do not have adequate wastewater treatment or control facilities. Enforcement action is planned against General Products Division, American Motors Corporation (formerly Kaiser Jeep Corporation), South Bend; Gentner Packing Company, South Bend; Middlebury Co-operative Creamery Company, Middlebury; and Angola Reduction Company, Angola, to obtain additional waste treatment. Lehman Veal and Poultry Packers, Wakarusa, will connect wastewaters to the Wakarusa sewage system when the Wakarusa treatment facilities are completed. Continental Can Company, Elkhart, will discharge the effluent from its industrial wastewater treatment plant to the Elkhart sewerage system when secondary treatment is added by the city. The Pennsylvania--

MR. STEIN: When is Elkhart going to do that?

MR. MILLER: Well, we are certifying them for priority for a construction grant and we hope they will soon get on with this work, very soon.

MR. STEIN: I don't know how you could do anything but certify it with the priorities since Mrs. Baldwin lives in Elkhart.

MR. POOLE: I don't think they are quite as far along as Portage, but they ought to be ready to let contracts in a very few months.

MR. MILLER: We say within 90 to at least 120 days after they receive the grant offer from FWPCA.

The Pennsylvania New York Central Transportation Company, Elkhart, will be required to provide additional treatment as soon as possible under action requested by the Board of the Indiana Attorney General for enforcement of the Board's order dated August 24, 1968. The company invested $25,000 for enlargement of the oil pond and improved oil skimming equipment during the summer of 1969;

however, additional treatment is needed. To date the Attorney General has not filed an action in this case.

A listing of industrial plants appears in Appendix II. The listing of projects completed since February 1969 and the time schedules for construction of wastewater treatment facilities appear in Appendix III. These appendices are up-dated copies of the material submitted to the Federal Water Pollution Control Administration to comply with Recommendation No. 3, Summary of Conference (First Session) Pollution of Lake Michigan and its Tributary Basin (Wisconsin - Michigan - Indiana - Illinois).

Status of implementation of recommendations of conferees.

The following numbered paragraphs provide current information on the status of implementation of recommendations of the conferees for the items to be undertaken by the State regulatory agencies.

1. Municipalities to achieve at least 80 percent reduction of total phosphorus by December 1972.

Municipalities with a population of approximately 2,000 and above have been notified of the requirement for at least 80 percent reduction of total phosphorus. Plans for new wastewater treatment plants or major improvements to existing plants are not approved by the Board unless facilities for phosphorus removal are included or approval is conditioned on the provision of such facilities. Portage and Elkhart have included phosphorus removal in planned sewage works projects. East Chicago's research project for advanced waste treatment includes studies of phosphorus removal, Kendallville's preliminary engineering report on sewage works improvements includes phosphorus removal and Gary has retained consulting engineers for recommendations for plant improvements including advanced waste treatment and phosphorus removal.

2. Industries to provide adequate treatment by December 1972.

Indiana industries listed in the Implementation Plans of the Water Quality Standards are scheduled to provide adequate treatment substantially before December 1972.

3. Submission of lists of discharges to the Lake Michigan Basin.

Lists of Indiana municipalities and industries discharging wastewater to the Lake Michigan Basin were submitted to the conferees on October 30, 1968. Copies of the lists, which have been updated to reflect current conditions, are appended.

4. Continuous disinfection of all municipal waste treatment plant effluents by May 1969.

All municipalities in Lake, LaPorte, and Porter Counties with effluent discharge to the basin have effluent chlorination facilities and are providing continuous disinfection throughout the year.

Municipalities in the St. Joseph River Drainage Basin have been notified of the requirement; however, South Bend, Lagrange, Ligonier, Goshen, and Ashley do not have adequate effluent chlorination facilities in operation or under construction. The city of South Bend is under order of the Stream Pollution Control Board to provide effluent chlorination. The city has appealed the Board's order and the case is set for hearing in the Starke County Circuit Court on April 17, 1970.

I might say that we hope we can resolve this one for you too, Mr. Chairman.

MR. STEIN: I hope it is going to be resolved.

I was in South Bend a few weeks ago and we are not going to treat South Bend any different than we treat Milwaukee.

MR. POOLE: That is all right with us.

MR. MILLER: All of these communities, except Ashley and Goshen, have filed applications for Federal grants under PL 660; however, only Lagrange has been certified for a priority because sufficient grant funds have not been available to reach the other municipalities. Goshen has facilities for effluent chlorination; however, adequate contact time is not provided.

5. Unified collection systems serving contiguous urban areas are to be encouraged.

In accordance with a recommendation of the Stream Pollution Control Board, the city of East Gary signed an agreement with the Gary Sanitary District for connection of its sewage collection system to the Gary system rather than continuing to utilize a separate treatment facility, and the town of Porter is discharging its sewage to the Chesterton sewage treatment plant.

6. Provision of adjustable overflow regulating devices on existing combined sewer systems by December 1970.

Detailed information has not been tabulated on the extent of the problem relative to overflow regulating devices; however, municipalities have been notified of this requirement. Gary has increased the interception of flow above dry weather flow on an average of approximately 10 mgd; in addition, consulting engineers have about completed the master plan for sewer improvements. This program will receive increased attention in the near future.

7. Separation of combined sewers in urban renewal projects; control of pollution by July 1977.

The Board's policy requires that sewer construction within a redevelopment area must provide separate stormwater and sanitary waste systems. It is also the policy of the Board not to approve combined sewers in new developments. It is anticipated that major pollution from combined sewer overflows will be controlled by July 1977. The city of East Chicago has construction under way for extensive sewer separation to serve a large urban renewal area and adjacent areas and a demonstration project, partially financed by a Federal Water Pollution Control Administration grant, to treat combined sewer overflows from approximately one-third of the city area. South Bend and Mishawaka have also undertaken sewer separation in urban renewal areas. Michigan City is completing construction of storm sewers to provide separation in approximately two-thirds of its area.

8. Discharge of treatable industrial wastes to municipal sewers is encouraged.

Municipalities are requested to establish and implement adequate sewer use ordinances to control industrial waste discharges to sewerage systems and are encouraged to accept industrial wastes amenable to treatment.

MR. STEIN: Are you familiar with our new proposed regulations? Not only are they going to be encouraged, but as far as we are concerned they are going to be required.

MR. MILLER: I think that we would have to say that we have been pretty much requiring this also.

MR. STEIN: Right.

MR. MILLER: And all projects have this in sewer use ordinances and this is the reason for connection of Continental Can and Elkhart and Lehman Poultry.

9. Disinfection of industrial wastes containing pathogenic organisms.

Inspections have been made on industrial waste outfalls that were suspected of containing sanitary sewage. No outlets have been found that require disinfection.

10. Prohibition of dumping of polluted material into Lake Michigan.

The Board has reaffirmed its opposition and does not approve the dumping of harbor dredgings in Lake Michigan. Indiana industries are providing disposal sites for dredgings adjacent to their properties.

MR. STEIN: Let me ask you for clarification there, when you say "does not approve the dumping of harbor dredgings in Lake Michigan," do you mean all dredgings?

MR. MILLER: This applies to all dredgings that we have had in Indiana.

MR. STEIN: Right. Thank you.

MR. MILLER: 12. Alewife disposal.

A plan is being developed to collect the anticipated 1970 dieoff of alewives and transport them to onshore disposal sites. An area is available on Bethlehem Steel Corporation property for disposal of alewives netted adjacent to Indiana.

13. Control of wastes from watercraft.

The 1969 Indiana General Assembly amended a 1957 Act concerning the operation of watercraft to remove the exclusion of Lake Michigan waters, and now prohibits the discharge of sewage from boats to all waters of the State, including Lake Michigan. The amendment also provides for the use of holding tanks, incinerators, or treatment systems which are approved by the Board. The effective date is January 1, 1971; however, the Board has initiated a program of voluntary compliance for the 1970 boating season.

I might say here also, like Illinois the Indiana law applies to all ships and boats and is not limited to the pleasure craft.

In addition, the 1969 General Assembly did also pass an anti-litter law that provides for the enforcement by peace officers and conservation officers of anti-litter. So this is also a program that has been activated since the last session of the conference.

14. Maximum use of areawide sewage facilities.

In addition to the situation mentioned in Item 5, other contiguous urbanized areas are encouraged to use areawide sewage facilities. The Merrillville Conservancy District in Lake County is now serving 2,575 homes with discharge to the Gary Sanitary District for treatment. A proposed sanitary sewer system to serve the Independence Hill Conservancy District will also connect to Merrillville Conservancy District sewers. A private utility near South Bend is serving homes and commercial facilities that formerly were served by small treatment plants and septic tank absorption systems. Sewage and wastes are discharged to the South Bend sewage treatment plant.

15. Evaluation of the pesticide problem.

A program to monitor pesticides in streams tributary to Lake Michigan was initiated in June 1969 and continued through October. Water samples were collected and analyzed monthly from stations located on the Indiana Harbor Canal, Burns Ditch, Trail Creek, and the St. Joseph River near South Bend and near Bristol. In addition, clams were placed in the stream at each of the above stations and collected a month later for analysis for pesticide concentrations.

A Federal Water Pollution Control Administration Research, Development, and Demonstration grant of $39,997 will permit the expansion of the pesticide monitoring program in 1970. The program will include additional sampling and analysis, and a detailed survey of the basin to determine the use of various pesticides.

A pesticide council has been appointed by the Governor to report on pesticide monitoring, legislation, and the impact of pesticides in the aquatic environment.

18. Inventory of potential for major spills of other hazardous material.

The inventory of sites where potential exists for major spills of oil and other hazardous material was submitted to the conferees on October 30, 1968. The oil industry in the Indiana Harbor Ship Canal area established an oil contingency plan in 1968--this is 1968 rather than 1966 as shown in the report. --to provide control and cleanup of spills of oil in the area. Early in 1970 the Board initiated steps to expand the Indiana Harbor Ship Canal plan to include all the major industries in the area and to encompass other hazardous materials. Work is under way on development of similar contingency plans for the Burns Ditch-Burns Waterway Harbor and the Michigan City Harbor areas. A contingency plan is being prepared for the entire State.

19. Arrangement for a broad spectrum of water quality analysis at water plant intakes.

Water quality analyses are being performed at the Gary-Hobart (West) and Michigan City filtration plants to conform with recommendations of the conferees with the following exceptions:

a. Samples are not being analyzed for silica and zooplankton.

b. Those parameters for which twice-weekly sampling is recommended are being accomplished, except that planktonic algae samples at Michigan City are collected and analyzed twice-monthly by Indiana State Board of Health personnel.

Copies of laboratory results have been submitted monthly to the Federal Water Pollution Control Administration, Ohio Basin Regional Office, for inclusion in STORET. Printouts will be available on an annual basis or more frequent if desired.

This concludes the report from the Stream Pollution Control Board.

MR. STEIN: Thank you, Mr. Miller, for your usual excellent report.

Are there any comments or questions?

MR. MAYO: I have got one question, Mr. Chairman.

I am advised that at Hammond about one-third of the effluent from Hammond finds its way into Lake Michigan and that at the present time there are no plans for phosphorus removal at Hammond. Is this correct?

MR. MILLER: Do you want to answer it for me?

MR. POOLE: Well, there are no plans for phosphorus removal, but I would remind you that we have scheduled a hearing for a few days from now with Hammond and I don't like to try my cases in public before we start in. This is a moot question on how much of Hammond's sewage goes to the lake and how much crosses the State line.

MR. STEIN: I would suggest we wait until the State hearing is concluded.

Are there any other comments or questions?

Mr. Frangos.

MR. FRANGOS: Go ahead.

MR. PURDY: I have a question--

MR. STEIN: Mr. Purdy.

MR. PURDY: --relating to the South Bend case. When was this referred to the Attorney General's office for enforcement?

MR. MILLER: Do you know? I don't.

MR. POOLE: It was about four years ago. It was referred under the Indiana procedures law. The defendant has 15 days to appeal an order and South Bend appealed the order. I don't know the exact date of the order, but I am guessing it was upwards of four years ago. And our problem has been to get the case set for trial. In other words, the movement was on the part of the city of South Bend and then, of course, it is quite willing to let the case sit in court for the next 40 years, I would presume.

MR. PURDY: Who is the enforcement officer for the State of Indiana? Would this be the Attorney General?

MR. POOLE: Yes. You see, as soon as it was appealed to the court it went out of my Board's hands and into the hands of the Attorney General.

MR. PURDY: Then I note on your Pennsylvania and New York Central Transportation Company at Elkhart that this was referred in August of 1968 to the Attorney General and that to date the Attorney General has not filed an action in this case. It would seem to me that the Indiana Board has pursued enforcement as far as it can, but it is being stymied in its enforcement actions here by the inaction of the Attorney General.

MR. POOLE: I hope that I can report that we have seen the light of day on that. Just in the very closing months of 1969 we had a deputy attorney general that was assigned to us. We were in a vacuum there for quite a while, and I think that as quickly as we can get through with the hearings that are scheduled and the ones that will be scheduled and the South Bend case that while I can't guarantee for the Attorney General I think we can look for action on this case.

MR. PURDY: Thank you.

MR. STEIN: Mr. Frangos.

MR. FRANGOS: Yes. I just have a couple of questions on South Bend.

Assuming that you move along as fast as you can and you get a favorable decision in that case, has the city been doing anything at all in contemplation of the action or have they just sat back and waited for the decision?

MR. MILLER: Actually we have approved plans or the Board has approved plans for the chlorination facilities and the city has actually been waiting on grant funds under the PL 660 to proceed with the project.

MR. POOLE: The South Bend order had two counts in it. One of them was for early chlorination, I have forgotten the date but it was a long time ago, and the other one was that within five years to develop their plans for plant expansion. They developed the first plans for an interim chlorination measure, which was to apply the chlorine in the secondary settling tanks, and then in the meantime they have developed the plans for plant expansion and final chlorination contact tanks. But they have insisted in our negotiations with them that they wanted to do it all at once rather than to go ahead with the interim chlorination procedures.

Now, they still have to incorporate in these plans for plant expansion phosphate removal.

MR. FRANGOS: Well, I note this is a circuit court. I assume that there would be avenues of appeal available to the city? I am a little bit confused. They seem to be proceeding, yet they are not.

MR. POOLE: We have avenues of appeal. This is the reason that I share the views that the Chairman expressed earlier, either yesterday or today, that you stay away from court as long as you can. I am reminded that we had the Plymouth, Indiana, case in the Indiana courts for 10 years and the Terre Haute case for 7 years.

MR. STEIN: Well, here, maybe I can explain this. Do you care if I talk about an Indiana community?

MR. POOLE: No.

MR. STEIN: The point is, South Bend had an application in for a Federal grant years ago when this program didn't have as much appeal as it has now. There may have been the same number, six or seven, on priority. Remember when a lot of people came in for grants as we began moving this up? They came up the next year and they came to number 27. Now when they shake them out they come out number 35 and they find themselves sinking on the Indiana priority list and until they move up they are not going to move.

If this is the attitude of South Bend, Mr. Frangos, I am going to tell you that I will not recommend that the Federal Government move with this 180-day notice against Milwaukee without moving against South Bend unless they have done this. And if this is South Bend's attitude, I suggest we are just going to have to recommend Federal action against South Bend. We have told this to South Bend and I have told this to South Bend, and where you may have been shocked by the front page of your newspaper this morning, I think South Bend got a shock a few weeks ago and we are not going back on that.

I think Indiana, at least the water pollution control group, has taken all the action that one can reasonably expect that agency to take to get a case moved forward within the limits of its capacity and the State government. This hasn't been successful. Unless it is resolved I think we have a Federal question and we are going to move.

MR. FRANGOS: Well, no, I just do this for information.

MR. STEIN: Yes.

MR. FRANGOS: Let me assure you that I am not being critical of the conferees or any State agencies.

Just one other question for my information. The population of South Bend, Perry?

MR. MILLER: Well, I can give you this. Just a minute. The population of South Bend in the 1960 census was 132,455.

MR. FRANGOS: Thanks.

MR. POOLE: I might just add one thing. This is just one man's opinion. But the South Bend problem as far as Lake Michigan is concerned--it is 80 miles from the lake--is the nutrients. Now, the South Bend problem as far as the State of Michigan is concerned and the St. Joseph River is an entirely different thing because it is only three miles from the South Bend sewage plant outfall into the State of Michigan. So there is definitely an interstate problem on bacteria and pollution in general in the St. Joe River.

But my personal feeling is that other than the nutrients, everything is pretty well worn out by the time it hits Lake Michigan.

MR. STEIN: You are probably right. I agree with you on that. But we also have an obligation to protect Michigan.

MR. POOLE: I understand. I am not denying that obligation.

MR. STEIN: And in order to do this equitably we are going to move ahead on this.

Are there any other comments?

I just have one comment. I am really a little startled here. You talk about a load of projects and then on page 2 you say, "The other projects have been stalled for some time because sufficient Federal grant funds have not been available."

What has ever happened to that Hoosier moral fiber? I never thought I would see this day.

MR. POOLE: Well, the only thing I could answer for that, it is a little presumptuous for me to attempt to answer for all the Hoosiers, but having had just little driblets of money pouring into the trough since 1956, they have sort of gotten in the general frame of mind that they ought to get their cut out of the trough before they spend their own money, and--

MR. STEIN: That is what I understood.

MR. POOLE: --I don't like it.

MR. STEIN: That is what I understood you to say. You mean to say that with these Federal funds we have corrupted those stalwart Hoosiers to depend on Federal money and not do it themselves?

MR. POOLE: Well, the record would sort of indicate that, Mr. Chairman.

MR. STEIN: Well, you know, this shakes--

MR. POOLE: We have 10 or 12 reimbursement projects going for the State as a whole.

MR. STEIN: People like us who have practically been brought up on McGuffey's Reader find notions like that just shaking their faith in fundamentals. (Laughter.)

Any other comments or questions?

Thank you very much.

May we call on Michigan. Mr. Purdy.

Unless you have other people?

MR. POOLE: No.

MR. PURDY: Mr. Chairman, I would like to have Mr. Frost, the Chief Engineer for the Water Resources Commission, present the State report.

F. B. Frost

FRANCIS B. FROST, CHIEF ENGINEER
WATER RESOURCES COMMISSION
MICHIGAN DEPARTMENT OF NATURAL RESOURCES
LANSING, MICHIGAN

MR. FROST: Mr. Chairman, conferees and ladies and gentlemen.

My name is Francis B. Frost. I am Chief Engineer of the Michigan Water Resources Commission.

Michigan's report also addresses itself to the recommendations of the conferees made at the First Session of the enforcement conference, and I will brief this portion of the report for you. However, there are certain appendices attached to the report which give the detailed program that Michigan is embarked on with time schedules. There are some 300 to 400 entries. I will not discuss those unless you ask me to. But I would ask that they be considered a part of the report and included in this record.

MR. STEIN: They will be included in the record as if read without objection.

MR. FROST: Thank you, Mr. Chairman.

(Which said report is as follows:)

FOR THE RECONVENED CONFERENCE
THIRD SESSION
ON
POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASINS
(WISCONSIN - ILLINOIS - INDIANA - MICHIGAN)

CALLED BY
MURRAY STEIN, CONFERENCE CHAIRMAN
DEPARTMENT OF THE INTERIOR

STARTING MARCH 31, 1970
MILWAUKEE, WISCONSIN

ON BEHALF OF
THE
MICHIGAN WATER RESOURCES COMMISSION
DEPARTMENT OF NATURAL RESOURCES
AND
MICHIGAN DEPARTMENT OF PUBLIC HEALTH

MARCH 1970

MICHIGAN WATER RESOURCES COMMISSION

John E. Vogt, Chairman, representing the Director, Michigan Department of Public Health

Stanley Quackenbush, Vice Chairman, representing the Director, Department of Agriculture

Gerald E. Eddy, representing the Director, Department of Natural Resources

John P. Woodford, representing the State Highway Commission

George F. Liddle, representing Municipal Groups

John H. Kitchel, representing Organized Conservation Groups

Jim Gilmore, representing Industrial Management Groups

Ralph W. Purdy
Executive Secretary

Purpose

At the first session of the Conference on Pollution of Lake Michigan and Its Tributary Basins which began on January 31, 1968 in Chicago, a joint report was submitted on behalf of the Michigan Water Resources Commission and the Michigan Department of Public Health which outlined various state programs to abate pollution and enhance the quality of the waters of Lake Michigan and its tributaries. A reconvened conference, second session, was held in Chicago, February 1968. A report was submitted for this second session with certain information specifically related to the recommendations stemming from the first session. This report will review, up-date and amplify this information.

RECOMMENDATION 1

Waste treatment is to be provided by all municipalities to achieve at least 80% reduction of total phosphorus and to produce an effluent that will not result in degradation of Lake Michigan's water quality. Such treatment will provide compliance with the water quality standards for Lake Michigan as approved by the Secretary of the Interior and the appropriate State water pollution control agency of Illinois, Indiana, Michigan or Wisconsin. This action is to be substantially accomplished by December 1972.

On February 5, 1968, letters were sent to all municipalities which have waste water treatment plants discharging to the surface waters of the state. The letter transmitted a copy of the Resolution adopted by the Water Resources Commission in October 1967 calling for removal of phosphorus compounds from waste discharges by June 1, 1977. It also pointed out that June 1, 1977 was an outside date for meeting the objective and that earlier compliance should be sought wherever possible.

On June 3, 1968, letters were sent to communities of 2,000 population or larger within the Lake Michigan basin advancing the date for phosphorus removal to December 1972 in conformance with the Secretary's recommendation. Those communities within the basin, and discharging to interstate waters, were also apprised of the need to provide secondary treatment by June 1, 1972, unless it can be demonstrated that a lesser degree of treatment or control will provide for water quality enhancement commensurate with present and proposed future uses as defined by the Federal-State interstate water quality standards.

Formal Stipulations were sent to communities which responded favorably to the requests for improved treatment. The Stipulations formalize an orderly study, design and construction program with performance dates consistent with the Secretary's recommendation. Communities not proceeding voluntarily have appeared before the Commission and Orders of Determination have been adopted against all of these with populations greater than 2,000 except Ludington, Battle Creek, Manistique and

St. Johns. Notices of Determination and Hearing have been adopted for Ludington and St. Johns and they appeared before the Commission for a hearing at the March, 1970 meeting. Manistique appeared before a Hearings Commissioner in October, 1969 and his recommendations were received on February 23, 1970. A hearing on his report will be held at the April, 1970 Commission meeting. The Commission has requested the Attorney General to reopen a previous court action concerning Battle Creek to add phosphate removal to the present court ordered treatment requirements.

RECOMMENDATION 2

> Industries not connected to municipal sewer systems are to provide treatment so as not to result in the degradation of Lake Michigan's water quality and to meet the water quality standards for Lake Michigan as approved by the Secretary of the Interior and the appropriate State water pollution control agency of Illinois, Indiana, Michigan or Wisconsin. This action is to be substantially accomplished by December 1972.

Appendix A includes a description of the type of waste treatment provided by industries, the status of their treatment, and any abatement action being taken against these industries. There are currently five industries listed which affect Lake Michigan water quality and all five are proceeding satisfactorily with abatement programs.

A recent amendment to Act 245, Public Acts of 1929, requires that every industrial or commercial entity which discharges liquid wastes into any public lake or stream shall have waste treatment facilities under control of operators certified by the Commission. The rules of certification are contained in Appendix C.

RECOMMENDATION 3

> Within six months each State water pollution control agency shall list the municipalities and industries discharging wastewater to the Lake Michigan Basin. The United States Department of the Interior will provide a comparable list of Federal installations. Each source so listed will indicate whether it discharges pollutants, including nutrients, having a deleterious effect on the Lake Michigan water quality. Detailed action plans for treatment of all waste having deleterious effect on the water quality of Lake Michigan are to be developed. Such plans shall identify the

> principal characteristics of the waste material now being discharged, the quantities, the proposed program for construction or modification of remedial facilities and a timetable for accomplishment, giving target dates in detail. This list shall be presented to the conferees for their review and consideration. Pollution sources shall be added to or removed from the list by formal action of the conferees.

Appendices A and B have been prepared in further response to recommendations 1, 2 and 3. These list all industrial and municipal waste effluent dischargers within the Lake Michigan basin and summarize information on the type of discharge, effect on Lake Michigan waters, improvement needs and the program for remedial action where such is needed. The lists are revised editions of those originally submitted to the Chairman by letter dated October 31, 1968. Additions to the list are indicated by an "ADD". Deletions are indicated by "DEL".

RECOMMENDATION 4

> Continuous disinfection is to be provided throughout the year for all municipal waste treatment plant effluents. This action is to be accomplished as soon as possible and not later than May 1969.

In January 1967, a policy was adopted by the Michigan Department of Public Health requiring year-round disinfection of waste effluent from all municipal treatment plants prior to discharge to the surface waters of the state. This program is in full force and effect at all such communities within the Lake Michigan basin.

RECOMMENDATION 5

> Unified collection systems serving contiguous urban areas are to be encouraged.

RECOMMENDATION 14

> Each of the State water pollution control agencies accelerate programs to provide for the maximum use of area-wide sewage facilities to discourage the proliferation of small treatment plants in contiguous urbanized areas and foster the replacement of septic tanks with adequate collection and treatment.

Act 228, Public Acts of 1967, is an act to regulate the subdivision of land, and to promote the public health by providing authority to the Michigan Department of Public Health to approve subdivision developments not served by public sewers, contingent on the suitability of soils. This program has already had a beneficial effect in accelerating municipal collection and disposal systems in nearby developing areas and preventing use of septic tank-tile field systems in unsuitable areas.

Act 329, Public Acts of 1966, as amended, establishes authority to provide state grants for sewage treatment facilities in conjunction with federal grants under United States Public Law 84-660, as amended. Pertinent provisions of Act 329 dealing with unified waste collection and treatment programs are as follows:

> "Sec. 7. Effective July 1, 1968 a grant shall not be made until the local agency's governing body has adopted and submitted to the water resources commission a comprehensive long-range plan for the control of pollution in the area within its jurisdiction, hereinafter referred to as the official plan. If more than 1 local agency has authority to provide service for sewage collection in the same area, the required plan may be submitted jointly by the local agencies concerned or by 1 local agency with the concurrence of the others.
>
> "Sec. 8. An official plan shall:
>
> (a) Provide for timely construction of sewage treatment facilities which will prevent the discharge of untreated or inadequately treated sewage or other wastes as defined by Act No. 245 of the Public Acts of 1929, as amended, being sections 323.1 to 323.12a of the Compiled Laws of 1948, into the waters of the state.
>
> (b) Provide for adequate planning, zoning, population projections and engineering and economic studies to delineate with all practicable precision those portions of the area which public sewerage systems may reasonably be expected to serve within 10 years, and within 20 years, and any areas in which the provision of such services is not reasonably foreseeable.

(c) Be in compliance with the state pollution control plan required by United States Public Law 84-660, as amended.

(d) Set forth a time schedule and proposed method of financing, construction and operation of the pollution control system.

(e) Be reviewed by the official planning agencies having jurisdiction within the local agency, including the regional planning agency, if any, for consistency with programs of planning for the area, which reviews shall be transmitted to the water resources commission with the plan.

"Sec. 10. (1) The water resources commission may approve the official plan as submitted or, if it finds the plan to be inconsistent with proper local or regional water pollution control, it may return the plan for appropriate modification. Where more than 1 local agency is involved in an official plan and the local agencies are unable to agree upon an official plan which the commission will approve, the commission shall develop the necessary official plan.

(2) The commission may provide technical assistance to local agencies in coordinating official plans.

(3) The commission shall cooperate with all appropriate federal, state, interstate and local agencies and with appropriate private organizations."

RECOMMENDATION 6

Adjustable overflow regulating devices are to be installed on existing combined sewer systems, and be so designed and operated as to utilize to the fullest extent possible the capacity of interceptor sewers for conveying combined flow to treatment facilities. The treatment facilities shall be modified where necessary to minimize bypassing. This action is to be taken as soon as possible and not later than December 1970.

RECOMMENDATION 7

Effective immediately, combined sewers are to be separated in coordination with all urban reconstruction projects, and prohibited in all new developments, except where other techniques can be applied to control such pollution. Pollution from combined sewers is to be controlled by July 1977.

In its supervisory capacity over municipal waste collection and treatment systems, the Michigan Department of Public Health continues to promote the most effective utilization of these systems. Adjustable regulating devices at points of combined overflow are one of a number of techniques utilized to make use of system storage capacities and minimize combined overflows.

In Michigan's water quality standards program and plan of implementation, the Commission has developed a policy wherein all new sewerage systems are to be developed on the basis of separate sewers for storm water and sanitary waste waters. Whenever feasible, separated sanitary wastewater systems are not to be discharged into existing combined systems. If such a discharge does occur, control facilities must be developed on the combined system to provide for enhancement of the receiving water quality commensurate with present and proposed future water uses and to be consistent with the requirements of state law. In those areas where noncompliance with the standards is determined to exist as the result of overflows of sanitary waste water in storm runoff, the Commission is requiring the best practicable treatment or control no later than June 1, 1977. The Commission is presently directing its attention to certain major metropolitan areas where problems of this type are known to exist.

RECOMMENDATION 8

> Discharge of treatable industrial wastes (following needed preliminary treatment) to municipal sewer systems is to be encouraged.

Michigan has had a long standing program that encourages the discharge of industrial wastes to municipal collection and treatment systems where such wastes are compatible or can be made compatible by pretreatment. The Kalamazoo area is a good example of a recent program of this type where paper mills within and around the city discharge treated or untreated deinking wastes and whitewater waste effluent to the city's activated sludge treatment plant. Since the second reconvened conference, all deinking waste and all whitewater except for that from two mills has been connected to the city system. This particular program has had a dramatic effect in upgrading the quality of the Kalamazoo River.

RECOMMENDATION 9

> Continuous disinfection is to be provided for industrial effluents containing pathogenic organisms, or organisms which indicate the presence of such pathogens, which may have a deleterious effect on persons coming into contact with Lake Michigan waters.

It is recognized that certain industries may have wastes of public health significance as illustrated by bacteriological testing procedures. Where such a public health hazard can be anticipated or be shown to exist, disinfection of the waste is required prior to discharge.

RECOMMENDATION 11

> The prohibition of the dumping of polluted material into Lake Michigan is to be accomplished as soon as possible. The Corps of Engineers and the States are requested to report to the conferees within six months concerning their program, at which time the conferees will consider adopting a coordinated approach toward the disposal of dredged material together with a target date for getting the program into operation.

As reported to the Chairman by letter dated October 31, 1968, Act 247, Public Acts of 1955, as amended, authorized the former Department of Conservation to regulate the deposition of materials on state bottom lands. All requests for deposition of materials on such bottom lands are evaluated to determine, prior to the issuance of a permit, whether the material to be deposited contains substances which will cause pollution.

RECOMMENDATION 13

> The representatives of the conferees within 60 days meet and agree upon uniform rules and regulations for controlling wastes from watercraft. These rules and regulations will generally conform with the harbor pollution code adopted by the City of Chicago and the regulations adopted by the Michigan Water Resources Commission. The use of maceration chlorination is not approved at the present time. Since each of the four states operates under different statutes, conferees will recommend to their respective boards, legislatures, etc., approval of the proposed uniform rules and regulations. Commensurate requirements controlling the discharge of wastes from commercial vessels is to be the responsibility of the Federal Government.

As previously reported, the Michigan Water Resources Commission in January 1968 adopted a rule to control pollution from marine toilets on watercraft. The rule does not allow the macerator-chlorinator and does authorize the use of holding tanks or incinerators. The rule became effective January 1, 1970 and public acceptance of this program has generally been encouraging. Private marina operators are beginning to install pump-out stations and treatment facilities where needed and the Michigan Waterways Commission has accelerated its program to provide similar facilities at state harbors of refuge on the Great Lakes. Forty-eight private and 17 state assisted marinas or harbors are planning or have already installed pump-out stations and treatment facilities where needed.

RECOMMENDATION 15

> Technical Committee on pesticides will be established to be chaired by a member of the Federal Water Pollution Control Administration with representatives from each state. The committee shall evaluate the pesticide problem and recommend to the conferees a program of monitoring and control. The first report will be submitted in six months to the conferees. The states shall seek legislation to license commercial applicators.

Act 233, Public Acts of 1959, as last amended by Act 91, Public Acts of 1968, provides for the licensing of persons engaged in the business of applying pesticides and economic poisons out of doors, with the licensing program being administered by the Director of the Michigan Department of Agriculture. The act further establishes an Advisory Committee to consult with and aid the Director in the administration of the act. The committee is composed of representatives of the Department of Public Health, Department of Natural Resources, the Aeronautics Commission, the Water Resources Commission, and the Pesticide Research Center of Michigan State University.

Michigan has been officially represented at all meetings of the Technical Committee and is acting on all of its recommendations. A federal grant was awarded on October 1, 1969 for pesticide monitoring of the Michigan portion of the Great Lakes basin, to be done in accord with recommendations of the Committee.

RECOMMENDATION 18

> State water pollution control agencies and U. S. Department of the Interior shall compile an inventory of all sites where potential exists for major spills of oil and other hazardous material, which may affect the water quality of Lake Michigan, and require that measures be taken where necessary to prevent the escape of this material to the waters. A report will be submitted to the conferees within six months.

A list of potential oil spill sites and other hazardous materials was submitted to the Chairman by letter of October 31, 1968 and was included as Appendix I for the second session of the reconvened conference. This list remains unchanged.

RECOMMENDATION 19

> The State water pollution control agencies shall arrange for a broad spectrum of water quality analyses, including planktonic algae counts, to be performed at least twice weekly at the following water filtration plants: Green Bay, Milwaukee, Evanston, Chicago (both plants), Gary, Michigan City, Benton Harbor, and Grand Rapids. Results will be reported annually to the conferees.

Water quality analysis programs have been expanded to comply with the Secretary's recommendation, at the cities of Benton Harbor and Grand Rapids. Data for 1969 at these two stations is summarized in the attached Appendix D. Daily analytical data is available and can be furnished upon request.

ADDITIONAL PROGRAMS

In addition to the programs undertaken to implement the recommendations of the conferees and continuing programs described in the first session of the Conference on Pollution of Lake Michigan and Its Tributary Basins, the Water Resources Commission has initiated several other programs to abate pollution and enhance water quality.

Michigan's Clean Water Bond Program

In November 1968 Michigan electors authorized the sale of $335 million worth of bonds for purposes of assisting communities in improving existing and constructing new waste treatment plants.

In June 1969 the Michigan State Legislature passed implementing legislation to provide for spending $285 million of the bond proceeds for sewage treatment works and intercepting sewers. In July 1969 implementing legislation was passed to authorize the use of the remaining $50 million for grants to assist in financing construction of collecting sewers.

A priority list of projects has been developed and has been approved by the Commission and the Legislature. At each monthly meeting of the Commission a report is presented which lists changes in the status of grant offers and developments since the previous month's meeting and summarizes all action to date. The report submitted at the March 1970 meeting is included in Appendix E.

Algal Monitoring of Waters Along Lake Michigan Shoreline

Samples were collected biweekly from 20 stations along the Lake Michigan shoreline during the summer recreation season (June to September) of 1969 to provide qualitative and quantitative algal data. Chemical and physical analyses of water samples were collected concurrently with the algal samples. These samples were collected in conjunction with an existing program for monitoring the bacterial quality of Michigan's Great Lakes Beaches which was described in Chapter V, Part 3 of the "Report on Water Pollution Control in the Michigan Portion of the Lake Michigan Basin and Its Tributaries" presented at the first Lake Michigan conference. Data from both the algal and bacterial programs are now stored in STORET. The program will be repeated during the summer of 1970. Further continuation is dependent upon funding.

Tributary Monitoring

The tributary monitoring program described in Chapter V, Part 8 of the report submitted to the first conference still includes the twelve stations near the mouths of Lower Peninsula tributaries to Lake Michigan but now also includes sever Upper Peninsula tributaries to Lake Michigan. Samples are now collected on a monthly basis. Data from this program is being placed in STORET.

Pesticide Monitoring

A Federal Water Pollution Control Administration grant for $40,000 was awarded to the Water Resources Commission on October 1, 1969 for pesticide monitoring of the Michigan portion of the Great Lakes basin, staff has been hired, the chemical laboratory is being enlarged and additional equipment has been ordered.

A study initiated in October 1968 to monitor pesticide runoff from an area treated with dieldrin and chlordane for control of Japanese beetles is continuing as part of this project. A report on our findings is ready for release and a paper on the subject will be presented at the Great Lakes Research Conference, April 2, 1970.

The monitoring program and attendant analytical capabilities will provide an excellent mechanism to identify other water contaminants of current concern such as polychlorinated biphenyls, mercury, and 2, 4, 5-T. Other purposes of the monitoring program are to determine the pesticide budget of Lake Michigan and to identify pesticide sources to the Great Lakes. The project is scheduled to terminate on September 30, 1970.

A status report will be presented at this third session of the reconvened conference by Carlos Fetterolf, Chief of Water Quality Appraisal Section of the Commission for Dr. Donald Mount, Chairman of the Technical Committee on Pesticides

Thermal Monitoring

Revised thermal standards were submitted to the Commission at a public hearing held during the March 1970 meeting. This hearing will be held open for a 30 day period.

Staff of the Commission have conducted investigations of all major sources of thermal inputs to the Great Lakes in the last two years. The six power plants that discharge to Lake Michigan were surveyed. Two additional surveys are planned for the summer of 1970 at locations where new power plant discharges will be located.

Industries with thermal discharges are being required (In Orders) to conduct pre and post operative surveys in the vicinity of their discharges. Four of the six power plants that discharge or will discharge to Lake Michigan have hired consultants to conduct investigations.

Biological Monitoring of Tributaries of Lake Michigan

In early August, 1969, two types of artificial substrate samplers, a rock basket and a Hester-Dendy, were placed in the mouths of 18 Michigan rivers tributary to Lake Michigan (Figure 1 of Appendix F). These substrates provided a suitable environment for colonization by stream macroinvertebrates and were removed after six weeks of exposure. At the time of artificial substrate retrieval Ponar dredge hauls from the river bottoms were made for comparative data. Preliminary results of species identifications and tabulations of colonizing organisms found on the artificial substrates and in Ponar dredge hauls are provided in Tables 1-18 of Appendix F.

APPENDIX A

DIRECT INDUSTRIAL DISCHARGES TO LAKE MICHIGAN

Company Name	Product	Location	Treatment	Discharge Characteristics after Treatment Flow MGD	 5-day BOD lbs/day	 Suspended Solids lbs/day	Pollution Status	Date of Order of Determination	Status and Abatement Action	Affects Lake Michigan Water Quality
1. Bay Street Steam Plant	Electricity	Traverse City		26.0			A	June 1, 1966	Control adequate	No
2. Cherry Growers, Inc.	(see Duffy-Mott, Inc.)									
3. Consumers Power Company	Electricity	Port Sheldon	Temperature control	175	No Data Available		A	*	Control adequate	No
4. Consumers Power Company	Electricity	Big Rock Point		72.0			A	November 1, 1960	Annual reports submitted on radioactive content of effluent	No
5. Dow Chemical Company	Chemicals	Ludington		1.0		1,000	B		Brine wastes to Lake Michigan. Control adequate	No
Duffy-Mott, Inc.	Canning products	Suttons Bay	Screening	0.8	No Data Available		B		Seasonal operation, control adequate	No
6. E. I. duPont de Nemours and Company	Synthetic rubber, freon acetylene	Montague	Septic tank, coagulation, sedimentation disc. 1500' off shore	17.3	4,328		A	June 25, 1964	Control adequate	No
7. Frigid Foods, Inc.	Canned cherries	Suttons Bay	Screening, city sewer	- - No Data Available - -			A	December 20, 1963	Control adequate	No
8. Inland Lime and Stone Company, Division Indiana Steel Company	Limestone and wash aggregate	Gulliver	Septic tank and settling basins	0.168		40.6 (8 hours)	A		Control adequate	No
9. Leelanau Fruit Company	Processed cherries	Suttons Bay	Vibrating screens and chlorination	- - No Data Available - -			B	June 25, 1963		No
10. Medusa Portland Cement	Cement	Charlevoix	Package treatment plant	- - No Data Available - -			B	April 28, 1966	Control adequate	No
11. Morgan McCool	Food products	Traverse City	Screening	.547	1,866	109	E		Voluntary stipulation to improve treatment or to connect to municipal system by Dec. 1971 or relocate	Yes
12. Northport Cherry Factory, Inc.	Canned cherries	Northport	Vibrating screens	- - No Data Available - -			A		Control adequate	No
13. Packaging Corporation of America	Paper-board	Filer City	Sedimentation	10.0	20,000	13,600	E_{sp}	September 24, 1959	Voluntary Stipulation for secondary treatment by Dec., 1972.	Yes
14. Penn-Dixie Cement Corporation	Cement	Petoskey	Septic tank settling ponds	- - No Data Available - -			A		Control adequate	No
15. U. P. Power Company	Electricity	Escanaba	- - - - - - No Data Available - - - - - -				A		Cooling waters only. Control adequate	No

INDUSTRIAL SURFACE WATER DISCHARGES IN THE LAKE MICHIGAN BASIN 1969

Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affects Lake Michigan Water Quality
UPPER PENINSULA											
1. Menominee River Basin											
American Can Company, Menominee Mill	Wax paper	Menominee	Menominee River	Pederson and vacuum disc save-alls	1.226	1,600	6,400	B_{sp}		Stipulation to add additional treatment. Final plans by Jan. 1, 1971. Start construction by June 1, 1971. Complete construction by Dec. 1, 1972	Yes
Daggett Cheese Company	Cheese	Daggett	Little Cedar River	Septic tank, whey hauled, floor wash to sump				A		Control adequate.	No
DEL Hanna Mining Company (Homer-Wauseca)										(Company has terminated operation)	
Hanna Mining Company (Groveland Mine)	Mining iron ore	Randville	Pine Creek	Lagoons	1.1			A	March 27 & 28, 1968	Control adequate	No
Inland Steel Company	Mining iron ore	Iron River	Iron River	Septic tank, lagoon for acid mine drainage	0.380		252	B		Control adequate	No
DEL Palestine Cheese Company										(Company has terminated operation)	
Scott Paper Company	Gr. wood and pulp	Menominee	Menominee River	Side hill save-alls	0.075			B		Control adequate	No
White House Milk Company	Butter and powdered milk	Stephenson	Little Cedar River	Comb. waste secondary treatment, trickling filter	0.0386	46	42.3	A	January 29, 1969	Control adequate.	No
2. Cedar River Basin											
. . . .				No major industries located in the basin					. . . .	. . . .	...
3. Ford River Basin											
. . . .				No major industries located in the basin					. . . .	. . . .	...
4. Escanaba River Basin											
Mead Corporation, Escanaba Division	Coated paper	Escanaba	Escanaba River	Secondary, trickling filter, Pederson save-all	4.3	8,800	30,000	B	May 28, 1968	Aerated lagoon for process wastes completed Sept. 1969	Yes
5. Days River Basin											
. . . .				No major industries located in the basin					. . . .	. . . .	...
6. Rapid River Basin											
Michigan Milk Producers Association, Rapid River Division	(see Rapid River Cheese Company)										
Rapid River Cheese Company	Milk Products	Rapid River	Rapid River	Septic tank, haul whey				B	October 24, 1968	Control adequate.	No
7. Whitefish River Basin											
. . . .				No major industries located in the basin					. . . .	. . . .	No
8. Sturgeon River Basin											
. . . .				No major industries located in the basin					. . . .	. . . .	...

	Company Name	Product	Location	Receiving Stream	Treatment Provided	Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks
	9. Manistique River Basin										
ADD	Larco Chemical Company, Inc.	Organic Rendering	Manistique	Manistique River					A	October 1968	
	Manistique Pulp and Paper Company	Paper	Manistique	Manistique River	City sewer, save-all, ponds	2.028	2,729	16,572	E_{sp}	March 26, 1964	Voluntary stipulation signed November 1969 to provide secondary treatment and phosphate removal
	LOWER PENINSULA										
	10. Pine River Basin										
	East Jordan Canning Company	Vegetable and Fruit	East Jordan	Jordan River	City sewer, lagoons				B		
ADD	East Jordan Iron Works	Gray Iron	East Jordan	Lake Charlevoix	Lagoons				B_{pc}	September 17, 1969	
DEL	Howe Leather Company, Inc.										(Company has terminated operation)
	Northern Michigan Electric Co-op	Power	Advance	Lake Charlevoix	Settling lagoon for fly ash				B_{c}	September 29, 19[illegible]	Control adequate
	11. Elk River Basin										
DEL	Columbia Fruit Division, Michigan Fruit Canners, Inc.										(Company has terminated operation)
	Elk Rapids Packing Company	Cherry canning	Elk Rapids	Elk Lake	Screening and chlorination	0.500	800	150			Seasonal operation
DEL	Faas Foods, Inc.										(Company has terminated operation)
	Lamina Tool and Die Corporation	Plating	Bellaire	Intermediate Lake and Cedar River	Batch treatment of cyanide				A		Control adequate.
	Michigan Fruit Canners, Inc.	Canned fruit	Ellsworth	Ellsworth Lake		3.620	1,900	3,537	B_{c}		Control adequate.
	12. Boardman River Basin										
	Chef Pierre, Inc.	Pies	Traverse City	Boardman Lake	Septic tank, dry well				A		Control adequate
	Parsons Corporation	Tube Fabrication	Traverse City	Mitchell Creek	Settling lagoon				A	August 29, 1963	Control adequate
	Traverse City Canning Company	Canned fruit	Traverse City	Boardman River	Screening	0.547	1,086	109	E		Stipulation April 23, 1969. Final plans by Mar. 1, 1971. Start construction by June 30, 1971. Complete construction by Dec. 31, 1971
	13. Betsie River Basin										
	Elberta Packing Company	Canned fruit	Elberta	Betsie Lake	Screening				B_{nc}		Studies underway
DEL	Pet, Inc. (Same as Pet Milk Company, Pet-Ritz Foods Division)										
	Pet Milk Company, Pet-Ritz Foods Division	Pies, apple and cherry	Frankfort	Betsie Lake	Screening	0.600	930	236	B_{s}		Studies underway to determine further treatment needs.
	14. Manistee River Basin										
	Hardy Salt Company (See Manistee Salt Works)										
	Manistee Salt Works	Salt	Manistee	Manistee Lake	Settling Lagoon	8.0			B		
	Michigan Chemical Corporation	Bromine chemicals	East Lake	Manistee Lake	Condensor	0.120	Negligible	17	A		Control adequate
	Morton Chemical Company	Salt, magnesium, bromine	Manistee	Manistee Lake	Eductors	15	Negligible	19,000	B_{sp}	April 30, 1959	Plans being prepared for additional treatment
	Morton Salt and Chemical Company (See Morton Chemical Company)										
	Packaging Corporation of America, American Box Board Division	Paper board	Filer City	Manistee Lake	Settling lagoons	5.00	2,000	5,000	E_{sp}	September 24, 1959	Plans underway for secondary treatment with effluent to Lake Michigan. Completion by June 1, 1972.
	15. Big Sable River Basin										
	- - - - - - No major industries located in the basin - - - - - -										- - - - - -
	16. Lincoln River Basin										
	- - - - - - No major industries located in the basin - - - - - -										- - - - - -

Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affects Lake Michigan Water Quality
LOWER PENINSULA CONTINUED											
17. Pere Marquette River Basin											
Dow Chemical Company	Chemicals	Ludington	Pere Marquette River	Clarifier, lagoon	44.3		7,000	B	May 22, 1967		No
Harbison-Walker Refractories, Inc.	Magnesite	Ludington	Pere Marquette River	Clarifiers, coagulant aids	9.3	Negligible	590	B	March 23, 1961	Control adequate.	No
ADD Nelson Packing Company	Meat Packing	Ludington	Unnamed Creek	Lagoons				A	February 23, 1961	Control Adequate	No
Sanders Meat Packing Company	Meat Packing	Custer	Black River	Lagoon	- - No Data Available - -			B			No
Stokely-Van Camp, Inc.	Cannery	Scottville	Pere Marquette River	Screening and chlorination	0.080	300	475	A	May 24, 1956	Seasonal operation.	No
18. Pentwater River Basin											
. . . .	. . . . No major industries located in the basin									. . . .	...
19. White River Basin											
Hooker Chemical Company	Chemicals Cl_2 - Caustic, HCl	Montague	White Lake	Sedimentation, sand filtration, chlorination	0.900		3,000	A	June 28, 1956	Control adequate. Program for reducing chlorides and sulfates underway.	No
Whitehall Leather Company, Division of Genesco	Tanning	Whitehall	White Lake	Lagoon to lake	1.2	2,100	600	E_{spc}		Completion of secondary treatment planned for Dec. 1, 1971.	No
20. Muskegon River Basin											
Brooks and Perkins, Inc., Cadillac Manufacturing Division	Aluminum sheet preparation	Cadillac	Clam River	Ion exchange	0.173	19	52	B	June 23, 1969	Control adequate.	No
Campbell, Wyant and Cannon Foundry Company	Castings	Muskegon	Ruddiman Drain	Oil recovery	- - No Data Available - -			B		Control adequate.	No
Central Concrete Products Company	Washed gravel	Big Rapids	Muskegon River	Settling ponds	0.079		14	A		Control adequate.	No
Consumers Power Company, B.C. Cobb Plant	Electric power	Muskegon	Muskegon River	Settling lagoons for sludge and fly ash	490	No Data Available		B		Control adequate.	No
Continental Motors Corporation, Downtown	Auto engines	Muskegon	Muskegon Lake	Oil separator	0.81	130	400	B_{pc}		Voluntary stipulation being developed.	No
Continental Motors Corporation, Getty Street Plant	Auto engines	Muskegon	Muskegon River	CN and chrome treatment, oil separation, acid neutralizing	0.46	38	196	A		Control adequate	No
Gonham Manufacturing Company, Inc.	Electroplating	Big Rapids	Muskegon River	Cr treatment	0.300	46	34	A	May 24, 1956	Control adequate.	No
Evart Products Company	Plastics	Evart	Twin Creek	Cooling water	- - No Data Available - -			A		Control adequate.	No
Gerber Products Company	Baby Food	Fremont	Darling Creek and Fremont Lake	Spray irrigation, cooling water to stream	1.0	No Data Available		A		Control adequate.	No
H. J. Heinz Company	Pickles	Lakeview	Tamarack Lake	Screening	- - No Data Available - -			B		Control adequate.	No
Kaydon Engineering Corporation	Bearings	Muskegon	South Branch Ruddiman Creek	Clarifiers	0.145	2.4	6.2	A	October 27, 1966	Control adequate.	No
Lakeway Chemicals, Inc.	Alcohol base detergents and dye intermediates	Muskegon Co., Egelston Twp.	Black River and Mona Lake Ground water	Seepage lagoons	0.304	700	7,500	E_{sp}	May 15, 1969	To improve treatment facilities. Studies underway.	No
Liberty Dairy Company	Bottling plant	Evart	Muskegon River	Wash and cooling water	0.171	161	142	A	August 24, 1966	Control adequate.	No
Naph-Sol Refining Company	Petroleum refining	North Muskegon	Muskegon River	API separator and lagoon	5.0	175	405	A	July 21, 1958	Control adequate.	No
Ott Chemical Company	Organic chemicals	Muskegon	Little Bear Creek	Equalization, aeration, incineration	0.4175	1,045		B	August 29, 1967	Order rescinded. Company to submit New Use statement for disposal well.	No
Paris Gravel Company	Washed sand and gravel	Big Rapids	Muskegon River	Settling ponds	0.120		94	A		Control adequate.	No

Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment			Pollution Status Rating	Date of Order of Determination	Remarks
					Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day			
LOWER PENINSULA CONTINUED										
Muskegon River Basin Continued										
Sealed Power Corporation	Auto parts	Muskegon Heights	Ruddiman Drain and Mona Lake	Reduction of chrome	- - No Data Available - -			B		
Semas Company	Apple juice	Fremont	Cole Drain, Brooks Creek and Fremont Lake	Cooling water to stream	1.12	No Data Available		A	July 26, 1961	Control adequate.
Wallace Stone Company	Washed stone and gravel	Hersey	Muskegon River	Settling ponds	0.128		198	A		
Warren, S. D., Company	Paper pulp	Muskegon	Muskegon Lake	Clarifiers, save-all, sludge lagoons	12.0	13,000	18,000	E_{spc}	December 7, 1966	Secondary treatment to be provided by December 1, 1972.
21. Grand River Basin										
Allen Packing Company	Slaughter-packing	Charlotte	County Farm Drain	Lagoon	- - No Data Available - -			A		Control adequate.
American Motors Corporation, Kelvinator Division	(See Kelvinator, Inc.)									
Amway Corporation	Home cleaning products	Ada	Grand River	Stabilization lagoons	0.063	809	107	B_{sp}	July 23, 1964	Plans being prepared for additional treatment.
A.S.P. Manufacturing Company	Plating	Grand Haven	Grand River	Chemical precipitation neutralization	0.084	No Data Available		B_c		Control adequate.
Atwood Corporation	Cadmium plating	Lowell	Flat River	Cyanide, copper and chrome reduction	0.20		84	B	December 16, 1960	
Aunt Jane's Foods, Division of the Borden Company	Pickle processing	Edmore	Stoney Creek	Screening	0.0242	74.7	29.8	B	June 28, 1967	New treatment facilities completed in 1969.
Bissell, Inc.	Sheet metal parts fabrication	Walker	Indian Mill Creek	Settling tanks	0.03	20	16		April 24, 1958	
Sanitary sewage								A		
Industrial wastes								A		
ADD Bliss, E.W.	Foundary Metal Stamping	Hastings	Thornapple River	None				D_s		
ADD Cascade Data	Data Processing	Cascade Twp., Kent Co.	Plaster Creek					A		
Challenge Porcelain Company	Bathtubs	Grand Haven	Grand River	None	0.090		25	E_p		Facilities partially completed.
ADD Chesapeake-Ohio Yards		Wyoming	Grand River					E_p		
Clark Equipment Company	Machinery	Jackson	Grand River	Lagoon & oil separator		12		B		Occasional loss of oil to [illegible]
Crystal Refining Company	Oil refining	Carson City	Fish Creek	Oil removal	0.043	3		E		Additional separator capacity under design.
Detroit Gasket and Manufacturing Company, Extruded Metal Division	Extrusion and aluminum anodizing	Belding	Flat River	Phosphate and oil removal	0.70	6.0	150	B		Additions made in 1969.
Duff-West Corporation	Cherry canning	Bailey	Fish Creek	Seepage lagoon, spray irrigation	- - No Data Available - -			A	March 25, 1965	
Eagle Ottawa Leather Company	Hide tanning	Grand Haven	Grand River	Screening	1.4	16,000	24,000	E_p	September 28, 1960	Additional treatment under study. May join city.
Federal Mogul	Lead, tin, copper plating	Greenville	Flat River	Chemical treatment, lagoons	0.725		188	A		Control adequate.
General Motors Corporation, Diesel Equipment Division	Metal manufacturing	Wyoming	Plaster Creek	Cyanide and chrome reduction, settling ponds	2.128	8		B_c	November 30, 1967	Additional treatment facilities under construction.
General Motors Corporation, Oldsmobile Forge Division	Forgings	Lansing	Grand River	Oil removal	- - No Data Available - -			A		Control adequate.
General Motors Corporation, Oldsmobile Division	Crank shafts and connecting rods	Delta Township, Eaton County	Jenne Drain	Chemical treatment, lagoon	0.072	2		A	February 24, 1960	Control adequate.

						Discharge Characteristics after Treatment						
	Company Name	Product	Location	Receiving Stream	Treatment Provided	Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affects Lake Michigan Water Quality
	LOWER PENINSULA CONTINUED											
	Grand River Basin Continued											
	Gibson Division, Hupp Corporation	(See White Consolidated Industries)										
	Gibson Division, Hupp Corporation	(See White Consolidated Industries)										
ADD	Grand Haven Brass Company		Grand Haven	Grand River					C			No
ADD	Grand Haven Stamped Products Company		Grand Haven	Harbor Basin & Grand River					A			No
	Grand Rapids Brass Company	Zinc die casting	Wyoming	Buck Creek	Cooling waters	- - No Data Available - -			A	March 25, 1966	Control adequate.	No
	Hastings Aluminum Products, Inc.	Aluminum casting	Hastings	Fall Creek		- - No Data Available - -			C	October 17, 1968	Restrictions established. Treatment planned.	No
	Hastings Manufacturing Company	Auto parts	Hastings	Thornapple River	Chrome and oil removal	0.20	No Data Available		B_p	November 30, 1961	Blow down control under design.	No
DEL	Hilfinger Jackson Corporation										(Company has terminated operation)	
	Hoover Ball and Bearing Company, Utilex Division	Plating	Fowlerville	Red Cedar River	Cyanide and chrome treatment, settling lagoon, oil skimmer.	0.300	20	120	C_c	January 28, 1953	Voluntary Stipulation May 16, 1968 sets new restrictions.	No
	Hudsonville Dairy	Dairy	Hudsonville	Rush Creek to Grand River	Septic tank	0.33	20	36	D		To connect to municipal system. September 1970.	No
	Indian Summer, Inc.	Apple juice and vinegar	Belding	Flat River	Settling pond	0.018	1,000	609	A		Spray irrigation installed September 1968.	No
	Jervis Corporation	Metal finishing	Grandville	Grand River	Chemical treatment of chrome, sedimentation	0.200		20	A		Control adequate	No
	Keeler Brass Company	Metal plating	Middleville	Thornapple River	Cyanide reduction, neutralization sludge removal	0.0146	4	2	A		Control adequate	No
	Kelvinator, Inc.	Appliances	Wyoming	Plaster Creek	Chemical treatment, connection to municipal system	- No data available -			D		Cooling water to stream. Intermittent oil losses.	No
	Kroger Company	Warehouse office	Paris Township, Kent County	Plaster Creek	Activated sludge, chlorination	0.01	1.2	51	B	July 26, 1956	Control adequate.	No
	Lefere Forge and Machine Company	Truck hubs and gear blanks	Jackson	Grand River	Oil separator	0.285	233	280	B		History of oil losses.	No
DEL	Leslie Metal Arts Company, Inc.	Metal stamping	Paris Twp., Kent County							September 29, 1965	Connected to municipal in 1968.	No
DEL	Light Metals Corporation	Extrusions	Wyoming							August 26, 1960	Connected to municipal system.	No
	Michigan Consolidated Gas Company	Gas compressor station	Six Lakes	First Lake at Six Lakes Drain	Cooling water	4.32	No Data Available		A	March 24, 1955	Control adequate.	No
	Michigan Milk Producers Association	Milk plant	Ovid	Maple River	Spray irrigation	0.5	15	0.87	A	November 29, 1962	Cooling water only to stream.	No
	Municipal Power Plant	Electric Power	Grand Haven	Grand River	Cooling water pond	0.34	No Data Available		A		Control adequate	No
	National Fruit Products Company, Inc.	Cherry process	Kent City	Ball Creek	Stabilization, ground seepage and irrigation	0.1	No Data Available		A		Seasonal discharge. Additional treatment added	No
	Nelson Metal Products, Division of Midland Ross Corporation	Die cast plant	Grandville	Buck Creek	None	- - No Data Available - -			A	July 28, 1966	Cooling water only, control adequate.	No
	New York Central Railroad	(See Penn Central Railroad)										
ADD	Oldberg Machine Company	Metal Machining	Grand Haven	Grand River	Oil Separator				B			No
	Ore-Ida Foods, Inc.	Fruit and vegetable freezing	Greenville	Dickerson Creek	Primary clarifier, lagoons, spray irrigation	- - No Data Available - -			A	September 23, 1964	Control adequate.	No
	Owens-Illinois Glass Company	Glass	Charlotte	Butternut Creek	Sedimentation, oil separation	- - No Data Available - -			A		Control adequate	No
	Packaging Corporation of America, American Box Board Division	Corrugated boxes	Grandville	Roy's Creek Drain	None	- - No Data Available - -			B_p		To connect to municipal system.	No
	Packaging Corporation of America, American Box Board Division	Paper cartons	Grand Rapids	Grand River	Save-alls	2.5	3,000	6,500	E_p		To connect to municipal system in 1968. Waiting for City on controls.	No
	Penn Central Railroad		Jackson	Grand River	Oil traps	0.07	No Data Available		A		Control Adequate	No

	Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment: Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affect Lake Michigan Water Quality
	LOWER GRAND RIVER CONTINUED											
	Pet Milk Company	Condensed milk	Coopersville	Deer Creek	In-plant controls	- - No Data Available - -			A		Connected to city. Only cooling water to stream	No
	Pittsburg Forging Company	Forging	Jackson	Grand River	Oil skimmer	0.07	No Data Available		A		Control adequate	No
	Ranney Refrigeration	Refrigerators	Greenville	Flat River	Lagoons	0.070	10		B			No
400	Reynolds Aluminum Corporation		Wyoming	Plaster Creek					B_s			No
	Rockford Paper Mills, Inc.	Box board	Rockford	Rogue River	Clarifiers	1.0	1,200	4,000	E_c		Spray irrigation by Spring of 1970	No
60L	Sonory Food Products										(Company has terminated operation)	No
	Saranac Manufacturing Company	Plating and buffing	Saranac	Grand River	Cyanide and chrome treatment, lagoon	0.180	No Data Available		D	July 20, 1964	New facilities in operation in 1963. Cyanide treatment is inadequate.	No
400	Sparta Foundry		Sparta	Rogue River					B			No
	Steggen-Lauper Corporation	Food warehouse and office	Grand Rapids	Plaster Creek	Activated sludge	0.0080	1.30	3.80	A	December 20, 1961	Control adequate	No
	Store-A-Way, Inc.	Meat processing	DeWitt	Lookingglass River	In-plant controls	0.001	10	30	A	January 18, 1961	Control adequate	No
	Super Food Service (See Steggen-Lauper Corporation)											
	Swanson Pickle Company	Pickle brining	Ravenna	Crockery Creek	Brine lagoon	- - No Data Available - -			A		Lagoons enlarged in 1968	No
400	THC Industries	Metal Parts	Belding	Flat River	None				E		Discharges chromic acid solution	No
	Trailmobile, Inc	Washing trailers and tank trucks	Wyoming	County drain to Plaster Creek	Grit and grease removal	0.001	No Data Available		A	June 22, 1961	Control adequate	No
	Universal Metal Products	Metal products	Saranac	Grand River	None	0.200		35	A		Control adequate	No
	White Consolidated Industries	Appliances	Greenville	Flat River	Lagoon	0.489	4	464	E_s		Treatment under design.	No
5.	White Consolidated Industries	Appliances	Belding	Flat River	Oil separator	-- No Data Available --			B_s		Plant study in progress.	No
	White Products Corporation	Water heaters, water softeners and plumbing ware	Middleville	Thornapple River	Cooling water	0.130	20	173	E	October 26, 1961	Periodic oil losses. Control needed.	No
	Withrow Pickle Company	Pickles	Sand Lake	Round Lake		- - No Data Available - -			C		No processing. Receiving station only.	No
37L	Wolverine World Wide, Inc.	Shoes, Tanning	Rockford						A	March 28, 1962	Connected to municipal system in 1940.	No
	22. Black River Basin											
	Bohn Aluminum Corporation	Extrusion aluminum	Holland	Wildwood Drain to Lake Macatawa	Nickel recovery and neutralization, phosphate recovery	0.215	23	80	A	October 25, 1966	Enlarged treatment facilities in 1969.	No
	DeWitt Poultry Processing	Poultry processing	Zeeland	Black River	Septic tank, screening, and sand filters	0.106	3.1	0.8	A		Control adequate	No
	Donnelly Mirrors, Inc.	Glass mirrors	Holland	Lake Macatawa	Lagoons	0.090	103	294	E_c		Additional treatment under construction.	No
	Hart and Cooley Manufacturing Company	Furnace supplies	Holland	Black River via county drain	Septic tank, stabilization ponds	0.090	38	21	B	April 23, 1962		No
	H. J. Heinz and Company	Canning, pickles, vinegar, and cider	Holland	Lake Macatawa	Screening	0.850	2,225	1,000	E_{ps}		Secondary treatment under design.	No
	Holland Suco Color Company	Organic colors and chemicals	Holland	Lake Macatawa	Clarifier, deep well disposal	0.800	1,700	400	E_s	May 27, 1966	Pilot study underway for secondary treatment.	No
	Holland Die Casting, Inc.	Zinc castings	Holland	Black River	Neutralization lagoon	0.223	50	40	A_c	March 25, 1959	New treatment facilities in 1969.	No
	James DeYoung Generating Station	Electric power	Holland	Lake Macatawa	Cooling water	- - No Data Available - -			B	June 28, 1967		No
	Keeler Brass Company	Metal products	Zeeland	Brower Drain	Lagoon and neutralization of acid	0.015	4	2	A			No
	Mead, Johnson and Company	Drugs	Zeeland	Black River	Activated sludge	0.182	90	197	A_s		Requires phosphate removal	No
	Miles Laboratories, Inc.	Drugs	Zeeland	Hunter Creek	Lagoon	1.17	187	60	B_c		New treatment added in 1969	No
	Parke, Davis and Company	Synthetic drugs, chemicals	Holland	Lake Macatawa	Primary settling and Cl_2 oxidation	7.2	146		A	February 24, 1960	Control adequate	No

LOWER PENINSULA CONTINUED

23. Kalamazoo River Basin

	Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment: Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affects Lake Michigan water Quality
	Albion Malleable Iron Company (See Hayes Albion, Inc.)											
	Allegan Metal Finishing Company	Electro-plating	Allegan	Kalamazoo River	Cyanide and metal treatment	0.037	No Data Available		B	March 20, 1963	Periodic chromium losses.	No
	Allied Paper Corporation, Monarch Division Solids Oxygen demand wastes	Paper	Kalamazoo	Portage Creek	Clarifier	2.0	400	300	 B B	October 21, 1963	Control adequate.	No
	Allied Paper Corporation, Bryant Division Solids Oxygen demand wastes	Paper	Kalamazoo	Portage Creek	Clarifier	6.0	6,000	7,000	 B B		Deinking wastes connected to city in September, 1960. Additional improvements underway.	
	Allied Paper Corporation, King Division Solids Oxygen demand wastes	Paper	Kalamazoo	Kalamazoo River	Clarifier	6.0	900	400	 A A	October 24, 1961		No
	Aluminum Extrusions, Inc. (See Hoover Ball & Bearing Co., Aluminum Extrusions Div.)											No
	American Aggregates Corporation	Gravel washing	Kalamazoo	Kalamazoo River	Sedimentation	- - No Data Available - -			A		Control adequate.	No
[illegible]	Auto-Ion	Chemicals	Kalamazoo	Kalamazoo River					E		Plan to connect to city.	No
[illegible]	Burroughs Manufacturing Corporation	Metals	Kalamazoo	Lauterhouse Drain	None				E			No
	Brown Paper Company, Mill 1 Solids Oxygen demand wastes Acid sewer	Parchment and wax paper	Parchment	Kalamazoo River	Lagoon	- - No Data Available - -			 A A E	October 24, 1961		No
	Brown Paper Company, Mill 2 Solids Oxygen demand wastes	Parchment and wax paper	Parchment	Kalamazoo River	Lagoon	- - No Data Available - -			 A A	October 24, 1961		No
	Brunswick Corporation	Furniture	Kalamazoo	Allen Creek	Sedimentation, oil separator	0.282		20.0	B	January 21, 1960		No
	Chase Manufacturing, Division of Gulf and Western (Scotts, Inc.)	Plating	Douglas	Kalamazoo River	Cyanide and chrome treatment lagoon	0.158	60		B			No
	Clark Equipment Company	Fork lift trucks	Battle Creek	Kalamazoo River	Oil removal	- - No Data Available - -			A		Treatment of soluble oils added in 1969.	No
	Consumers Power Company	Electric power	Battle Creek	Battle Creek River	Cooling water	- - No Data Available - -			B			No
	Consumers Power Company	Electric power	Comstock	Kalamazoo River	Cooling water	- - No Data Available - -			A		Lagoons enlarged.	No
	Corning Glass Works	Glass, TV tubes	Albion	Kalamazoo River	Clarifier, neutralization	0.03	No Data Available		B_p	February 23, 1966	Control adequate.	No
	Culligan Soft Water, Inc.	Water softening	Battle Creek	Kalamazoo River	Controlled discharge	0.006	No Data Available		E_p	September 29, 1964	Restricted to 1000# Cl/day	No
	DeKleine Packing Company	Pickles and relish	Bentheim	Black Creek to Big Rabbit River	Septic tank, screen	- - No Data Available - -			B	June 27, 1957	Additional lagoon added.	No
	Eaton, Yale and Towne, Inc., Marshall Division	Gears	Marshall	Kalamazoo River	Lagoons	0.144	.20		B_c		Additions to treatment completed in 1969.	No
[illegible]	Ely, Thomas H., Plumbing & Heating, Inc.	Water Softening	Kalamazoo	Kalamazoo River	None				A	October 30, 1967		No
	General Foods Corporation	Cereal	Battle Creek	Battle Creek River	Cooling water	- - No Data Available - -			B			No
	General Signal Company, Hydreco Division	Pumps, motors, valves	Galesburg	Kalamazoo River	Trickling filter, oil flotation and removal	0.182	7.13	8.98	A A	September 30, 1966	Control adequate	No
	Grand Trunk Railroad Company	Repair of equipment	Battle Creek	Battle Creek River	Oil separator	0.360	No Data Available		B_p		Plans approved for storm water retention.	No
	Hayes Albion, Inc.	Iron castings	Albion	Kalamazoo River	Dust collection, settling	0.780		4,611	E_c		Additional treatment under construction. Completion scheduled for 1970.	No
[illegible]	Hercules, Inc.	Resin emulsions, tallows, fatty acids	Parchment	Kalamazoo River	None				E_{cp}		To connect to city after providing solids removal and pH control.	No
[illegible]	Holland Rendering Works	Rendering, feed and fertilizer	New Richmond	Kalamazoo River	Septic tank, settling, irrigation	0.009			B	February 24, 1956		No
	Hoover Ball & Bearing Company, Aluminum Extrusions Division	Extrudes aluminum	Charlotte	Battle Creek	Lagoons	--No Data Available--			A		Additional lagoons added.	No
	Kellogg Company	Cereal	Battle Creek	Battle Creek River	Cooling water	- - No Data Available - -			A			No
	Lakeside Refining Company	Fuel oil	Kalamazoo	Allen Creek	Oil flotation, skimming, recovery 26	- - No Data Available - -			A		Control adequate.	No

	Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment			Pollution Status Rating	Date of Order of Determination	Remarks
						Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day			
	LOWER PENINSULA CONTINUED										
	Kalamazoo River Basin Continued										
	Lorton Products Company	(See Holland Rendering Works)									
ADD	McGraw Edison Company, Albion Division		Albion	Kalamazoo River					B		Connected to city storm sewer.
	Menasha Corporation, Paper Board Division Solids Oxygen demand wastes	Paper board	Otsego	Kalamazoo River	Save-all, sedimentation, evaporation	0.380	7,300	700	 A B_c	October 27, 1963	Aerated lagoon added in 1968.
	Michigan Fruit Canners, Inc.	Fruit and vegetable canning	Fennville	Mann Creek via county drain	Irrigation	0.080	2,300	400	B_c		New irrigation system in 1968.
	Murray Packing Company	Slaughter and packing	Plainwell	Kalamazoo River	Lagoons	0. 0	220		B	September 29, 1966	New clarifier and lagoons added in 1968.
	New York Air Brake Company Industrial wastes Sanitary sewage	(See General Signal Company, Hydreco Division)									
	North American Aluminum Extrusions Corporation	Aluminum tubing and anodizing	Parchment	Travis Creek	Septic tank, neutralization, lagoons	0.7		124	A	October 30, 1967	New lagoons added February 1, 1968.
	Pet Milk Company	Dairy products	Wayland	Rabbit River	Aeration, Filters and Irrigation	0.040	146	27	B_c		Control adequate. Studies underway.
	Plainwell Canning Company	Canned fruit	Plainwell	Kalamazoo River	Seasonal spray irrigation	0.0036	494		A		
DEL	Ralston Purina Company	Dog and cat food	Battle Creek	Battle Creek River		- - No Data Available - -					Connected to municipal system.
	Shakespeare Corporation	Electro-plating	Kalamazoo	Kalamazoo River	Plating recovery system	- - No Data Available - -			A	February 23, 1966	Control adequate.
ADD	Ty-King	Electro-plating Aluminum window parts	Plainwell	Kalamazoo River	None	0.009	0.15	0.7	E		Plan to connect to city.
	Union Steel Products Co.	Wire products	Albion	Kalamazoo River	Complete treatment for plating waste	- - No Data Available - -			A		Control adequate.
DEL	Valley Metal Products Company										(Company has terminated operation.)
	Waldorf Paper Products Company, Mac Sim Bar Division Solids Oxygen demand wastes	Paper board	Otsego	Kalamazoo River	Clarifier and stabilization lagoons	1.1	2,035	940	 A B		New aerator added.
	Weyerhaeuser Company Solids Oxygen demand wastes	Paper	Plainwell	Kalamazoo River	Activated sludge	1.58	256	714	 A A		New treatment plant in 1968. Control adequate.
ADD	Wolverine Electric Co-op, Inc.	Electrical power	Burnips	Rabbit River	Evaporating cooling towers				B	August 31, 1967	
	24. Black River Basin										
	Du-well Decorative Company	Decorative metal	Bangor	Black River	Complete plating waste treatment	0.20		122	B		Control adequate.
	Michigan Fruit Canners, Inc.	Fruit products	South Haven	Black River	Screening	0.447	2,316	455.4	B		Connection to municipal system. Overflows to surface waters. Now under better control.
	South Haven Chemical Company	Chemicals	South Haven	Black River	Controlled discharge	- - No Data Available - -			A		Control adequate.
	25. Paw Paw River Basin										
ADD	Automotive Specialists Company	Automobile Accessories	St. Joseph	Paw Paw River					E_{po}		Plan to connect to city.
ADD	Benton Harbor Malleable		Benton Harbor	Ox Creek					E_p		
	Burnette Farms Packing Company	Canning vegetables and fruits	Lawrence	Brush Creek	Septic tank and spray irrigation	0.080	380		B_p		New facilities planned for 1970.
	Clark Equipment Company	Machinery	Benton Township Berrien County	Ox Creek	Cooling water	0.050	No Data Available		B_p		Control adequate
	Coloma Cooperative Canning Company	Canning	Coloma	Paw Paw River	Screening, irrigation, lagoon	- - No Data Available - -			B		
	Du-Well Decorative Company	Chrome plated parts	Hartford	Pine Creek	Complete plating waste treatment	0.071		84.5	A		
	Hartford Metal Production Company	(See Du-Well Decorative Company)									

	Company Name	Product	Location	Receiving Stream	Treatment Provided	Discharge Characteristics after Treatment: Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affecting Lake Michigan Water Quality
	LOWER PENINSULA CONTINUED											
	Paw Paw River Basin Continued											
	Hanna Bear Canning Company	Fruit products	Lawton	Tomline Drain	Lagoons	- - No Data Available - -			A	July 28, 1960	Control adequate.	No
	Midwest Timer Service, Inc.	Chrome plating	Hagar Township Berrien County	Pratt Drain	Chemical precipitation and lagoons	- - No Data Available - -			A	July 28, 1960	Control adequate.	No
	Millburg Fruit Exchange (Jay Foods)	Canning	Millburg	Blue Creek	Screening, oxidation ponds	- - No Data Available - -			A_p		Control adequate.	No
	Murch, A. F. and Company	Cherry and grape juice	Paw Paw	Jennings Drain	Septic tank, spray irrigation	0.72	300		E_{pc}	September 21, 1961	Additional treatment under construction	No
ADD	Pasquale Food Products	Pizza Pies	Benton Twp., Berrien Co.	Paw Paw River					A			No
	Pearl Grange Packing Company	Food products	Benton Township, Berrien County	Yore and Stauffer Drain	Septic tank, lagoon, spray irrigation	0.025	300		A		Control adequate.	No
	Pet Milk Company, Musselman-Duon Division	Canning vegetables and fruits	Paw Paw	Paw Paw River	Screening, spray irrigation	0.10	340	330	E		Requires additional treatment.	No
	Quality Frozen Foods	Food products	Lawrence	Paw Paw River	Screening, lagoon, spray irrigation	- - No Data Available - -			A			No
	Sill Farms	Cherry processing	Lawrence	Brush Creek	Screening, spray irrigation	- - No Data Available - -			B			No
ADD	M. Stephens	Vinegar	Galena	Ryno Drain					B			No
ADD	Twin Cities Plating Company	Chrome Plating	Benton Harbor	Paw Paw River via Canal	None	0.14	7	77	E_p			No
	Watervliet Paper Company	Paper	Watervliet	Paw Paw River	Save-all	1.75	3,000	12,000	E		Studies underway.	No
	Welch Grape Juice Company	Juices, jams	Lawton	Lawton Creek	Screening, spray irrigation	0.8	1,000		A		Control adequate	No
	26. St. Joseph River Basin											
	Alpha, Inc.	Metal plating and tubing	Eau Claire	Extension Drain and other waters	Chemical treatment, lagoon	1.0	60	1,000	D	February 23, 1966	Additional treatment provided in 1968.	No
	American International Aluminum (See Essex International, Inc.)											
	Bendix Corporation	Gray iron foundry	St. Joseph	Hickory Creek	Cooling water	- - No Data Available - -			A	March 30, 1960	Control adequate.	No
ADD	Bundy Hill Gravel Company	Gravel	Coldwater	Coldwater River					A		Control adequate	No
	Clark Equipment Company	Machinery	Buchanan	McCoy Creek	Oil trap	2.200	75	413	E_s		New oil separator needed	No
	Coldwater Rendering Works	Meat packing	Coldwater	Coldwater Lake	Sedimentation	0.75	131	107	E_p		Plans submitted March 1, 1970.	No
	Denton Sleeper Company (See Denton Sleeping Garment Mills, Inc.)											
	Denton Sleeping Garment Mills, Inc.	Baby Clothes	Centreville	Prairie River	None	0.080	95	170	E_s	August 26, 1960		No
	Eau Claire Packing Company	Canning	Eau Claire	Farmers Creek	Screening, sedimentation lagoon, spray irrigation	0.696	40	30	A_c		Control adequate.	No
ADD	Essex International, Inc.	Aluminum extrusions	Coldwater	Randall Lake	Ponds and skimming devices	0.063		20	A		Additional lagoons completed in 1969.	
	Essex International, Inc.	Electrical wire	Three Rivers	St. Joseph River	Cooling water, closed system	--No Data Available--			B_c	January 3, 1964		No
	Flam Pickle Company	Pickles	Eau Claire	Love Creek	Septic and settling tanks	0.007	40	7.4	B_c		New screen provided in 1969.	No
	French Paper Company	Paper manufacturing	Niles	St. Joseph River	Save-all	0.811	2,020	3,620	E_{pc}		Stipulation signed September, 1969. Completion by December, 1972.	No
ADD	Home Plating Company	Metal Plating	Sturgis	Fawn River		0.036			E_c			
	Industrial Rubber Goods Company	Rubber goods and body trim	St. Joseph	Abraham Drain	Septic tank and Cl_2	- - No Data Available - -			B_s		Control adequate.	No
	Kawneer Company, Plant No. 1	Building products	Niles	St. Joseph River	Septic tank, chrome treatment	0.46	125	2,300	E_p	February 26, 1953	Stipulation signed March 5, 1970. Completion by Jan. 1, 1972.	No
	Kingston Products Corporation, Douglas Manufacturing Division	Electroplating	Bronson	County Drain 30	City and chemical treatment of plating wastes	0.158	160		B_s	March 21, 1950	Control adequate.	No
	Kirsch Manufacturing Company	Metal industry	Sturgis	Fawn River	Oil removal	0.15	4	200	B		Control adequate.	No
	Kirsch Manufacturing Company	Metal industry	White Pigeon	White Pigeon Lake	None	0.7	8	204	B_s			No
	Lamb-Knit Goods	Clothing	Colon	Sturgeon Lake	Septic tank, tile field	- - No Data Available - -			A		New disposal field. To connect to city when system is built.	No
	Michigan Mushroom Company	Mushrooms and [illegible]	Niles	St. Joseph River	Vibrating screens	0.025	200		A		Control adequate.	No

					Discharge Characteristics After Treatment						
Company Name	Product	Location	Receiving Stream	Treatment Provided	Flow MGD	5-day BOD lbs/day	Suspended Solids lbs/day	Pollution Status Rating	Date of Order of Determination	Remarks	Affects Lake Michigan Water Quality
LOWER PENINSULA CONTINUED											
St. Joseph River Basin Continued											
Midland Wire Corporation (See Essex International, Inc.)											
Municipal Power Plant	Electricity	Coldwater	Coldwater River	Cooling tower	- - No Data Available - -			A		Blow down has been corrected.	No
Quincy Products Company	Refrigerator coils	Quincy	Marble Lake via county drain	Chemical treatment-destruction of CN	0.050	80	7.4	A	May 28, 1968	Additional treatment provided in 1968.	No
Research Molding and Film Company		Hamden	St. Joseph River	Oil trap, ponds	0.100	No Data Available		B_s			No
Rudy Manufacturing Company (See Sun Strand Corporation)											
Schaefer Manufacturing Company	Electroplating and anodizing	Union City	St. Joseph River	In-plant control	0.05	80		E_p		New plant site being selected.	No
Schmidt Packing Company	Meat packing	Niles	Douglas Creek	None				E		Company terminated slaughtering operation in 1969. Cooling water only.	No
Silver Mill Frozen Foods, Inc.	Fruit packing	Eau Claire	Pompey Creek	Lagoons	0.08	500	130	A	January 21, 1966	New irrigation field in 1969.	No
Simplicity Pattern Company, Inc.	Paper patterns	Niles	St. Joseph River via Lenny Creek	Save-all units	1.10	1,030	2,300	E_s		Stipulation signed April 30, 1969. Secondary treatment by December 1, 1972.	No
Simpson-Lee Paper Company	Paper	Vicksburg	Gourdneck Creek	Sedimentation with coagulation	4.21	8,300	2,630	E_s	December 5, 1967	Stipulation signed August, 1969. Secondary treatment by June 1, 1972.	No
Stover Soft Water Service	Recharge water softeners	Berrien Springs	St. Joseph River	Controlled discharge	0.01	No Data Available		A	April 26, 1966	Control adequate.	No
Sun Strand Corporation	Heat exchangers	Dowagiac	Pine Lake Drain	Cooling water to lagoons	0.200	4.1		B_p	December 7, 1966		No
United Foods, Inc.	Canned and frozen food	Sodus	Pipestone Creek via county drain	Screening, irrigation	- - No Data Available - -			A			No
Weyerhaeuser Company	Paper	White Pigeon	White Pigeon River	Flotation, save-all, clarifiers	3.420	1,000	2,537	B		Additional clarifier in 1968. In-plant improvements.	No
Whirlpool Corporation	Nickel plating	Benton Harbor	St. Joseph River	Chemical treatment and lagoons	0.144	No Data Available		B_p	September 23, 1964	New plans being prepared.	No
ADD Whirlpool Corporation	Washing machines	St. Joseph	St. Joseph River	None				E_p			No
Industries with Discharges in Minor Drainage Areas											
Bil-Mar Foods, Inc.	Poultry processing	Borculo	Pigeon River	Settling basins, lagoons				B	August 20, 1967	Additional lagoons added in 1969.	No
Bil-Mar Poultry (See Bil-Mar Foods, Inc.)											
ADD Cell Anodizers, Inc.	Aluminum anodizing	Muskegon	Little Black Creek	Seepage lagoons				B	July 28, 1969		No
Elk Rapids Packing Company	Fruit packing	Lake Leelanau	Lake Leelanau	Screening and chlorination	0.477	800	150	A	June 20, 1961	Control adequate.	No
Onekama Canning Company	Canning cherries	Onekama	Portage Lake	Screening				A		Control adequate.	No
Petoskey Plating Company	Auto parts	Petoskey	Bear River	Chemical treatment	0.007			A			No
ADD Plastic Masters		New Buffalo	Unnamed Creek to Lake Michigan					B			No
Smeltzer Packing Company	Cherries and apples	Benzonia	Herring Lake	Screening				A		Control adequate.	No
ADD Thermo-Chem., Inc.		Muskegon	Black Creek					B	September 27, 1967		No

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Key to Control Status

A - Control adequate
B - Control provided - adequacy not fully established
C - No control--need not established
D - Control provided--protection available
E - Control inadequate
    c - construction underway
    p - plans being prepared
    s - studies underway

APPENDIX B

MICHIGAN'S MUNICIPAL WASTEWATER DISCHARGE INVENTORY LAKE MICHIGAN BASIN

Community	Receiving Waters	Treatment Provided	Population (1964 est.)	Discharge Characteristics		Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS		PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review		
				5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l			Nutrient Reduction	New or Improved Treatment	Plans Approved	Start Construction	Complete
1. MENOMINEE (MICH.)												
Alpha	Armstrong Creek	Primary ST	300			Voluntarily submitted preliminary plans for advanced treatment.	no					
Caspian	Iron River	Primary ST	1,400			A Stipulation for phosphorus removal developed March 10, 1970.	no			1-1-71	6-1-71	12-1-72
Crystal Falls	Paint River	Secondary L	2,200			Health Department agreement	no		x	11-1-67	5-1-68	5-1-69
Gaastra	Iron River	Primary ST	800			A Stipulation for phosphorus removal developed March 10, 1970.	no			1-1-71	6-1-71	12-1-72
Iron Mountain-Kingsford	Menominee River	Primary	16,000	192	89	Final Order of Determination September 22, 1969.	yes	x	 x	9-1-70 3-1-71	6-1-71 8-1-71	12-1-72 6-1-72
Iron River	Iron River	Primary	3,300	97	76	A Stipulation was developed August 1, 1969.	yes	x		1-1-71	6-1-71	12-1-72
Menominee	Menominee River	Primary	11,400	61	60	A Stipulation was developed February, 1968.	yes	x	 x	9-1-70 12-1-70	6-1-71 6-1-71	12-1-72 12-1-72
Mineral Hills	Iron River	Primary ST	300				no					
Norway	Menominee River	Primary	3,200			A Final Order of Determination adopted September 22, 1969.	yes	x		3-1-71	12-1-71	12-1-72
South Republic	Michigamme River	Primary ST	400				no					
Stambaugh	Iron River	Secondary AS	1,900	41	30	A Stipulation for phosphorus removal developed November 1969.	no			1-1-71	6-1-71	12-1-72
Stephenson	Little Cedar River	Secondary TF AS	820	37	36		no					
Vulcan	Menominee River	Primary ST	480				no					
2. BIG CEDAR												
Pinecrest Medicare Facility	Big Cedar River	Secondary TF				Treatment considered adequate.	no					
3. FORD												
--No Large Population Centers in Basin--												
4. ESCANABA												
Palmer	Warner Creek	Primary ST	860				no					
5. BAYS												
Gladstone	Lake Michigan	Primary	5,400	188	110	Final Order of Determination adopted September, 1969.	yes	x	 x	12-1-70 12-1-70	6-1-71 5-1-71	12-1-72 6-1-72

Community	Receiving Waters	Treatment Provided	Population (1960 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans Approved	Start Construction	Complete
6. RAPID												
Masonville Township	Rapid River	None	800				no					
7. WHITEFISH												
------No Large Population Centers in Basin------												
8. STURGEON												
Sagola	West Branch Sturgeon	Primary ST	100				no					
MANISTIQUE												
Manistique	Manistique River	Primary	4,600	22	17	To appear at statutory hearing April, 1970.	yes	X				
10. PINE												
Boyne City	Lake Charlevoix	Primary	2,800	49	39	A Stipulation developed March, 1969.	yes	X		9-1-70	6-1-71	12-1-7
Charlevoix	Pine River	Primary	2,900	130	64	A Stipulation developed February, 1969.	yes	X		9-1-70	6-1-71	12-1-72
East Jordan	Lake Charlevoix	Primary	1,920	65	66	A Stipulation developed June, 1969.	yes	X		9-1-70	6-1-71	12-1-72
11. ELK												
Bellaire	Intermediate River	None	700			A Stipulation developed July, 1969 to provide treatment.	no			2-1-70	6-1-70	6-1-71
Elk Rapids	Elk River	Primary	1,015			Voluntarily updating treatment.	no					
BOARDMAN												
Kalkaska	Boardman River	Secondary L	1,320			Treatment considered adequate.	no					
Traverse City	Boardman River	Primary	18,500	164	66	Final Order of Determination dated August, 1968.	yes	X	X	6-1-70	7-15-70	12-31-71
13. BETSIE												
Beulah	Crystal Lake	Primary ST	440			Voluntarily proceeding with phosphorus removal.	yes	X	X			
Elberta	Betsie River	Primary	560	100	78		no					
Frankfort	Betsie River	Primary	1,690	334	107	Voluntarily proceeding with studies to update treatment.	no					
14. MANISTEE												
Manistee	Manistee River	Primary	8,300	120	69	A Stipulation developed December, 1968.	yes	X		9-1-70	6-1-70	12-1-72
Manton	Cedar and Tarlum Creeks	None	1,060			To have statutory hearing April, 1970.	no					

Community	Receiving Waters	Treatment Provided	Population (1966 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans Approved	Start Construction	Compl
15. BIG SABLE												
----No Large Population Centers in Basin----												
16. LINCOLN												
----No Large Population Centers in Basin----												
17. PERE MARQUETTE												
Custer	Black Creek	None	316			Final Order adopted June 1969, to provide treatment.	no			6-1-70	3-1-71	6-1-72
Ludington	Pere Marquette River	Primary	9,000	28	63	Statutory Hearing March 1970.	yes	x		3-1-71	12-1-71	12-1-72
Scottville	Pere Marquette River	Secondary L	1,245			Treatment considered adequate.	no					
18. PENTWATER												
Hart	Pentwater River	Secondary L	1,990			Treatment considered adequate.	no					
Pentwater	Pentwater River	Secondary L	1,030			Treatment considered adequate.	no					
19. WHITE												
White Cloud	White River	Primary IT	1,000	67	30		no					
Whitehall	White River	Primary	2,800	110	60	A Stipulation developed October 8, 1969.	yes	x		9-1-70	6-1-71	12-1-72
									x	3-1-71	8-1-71	10-1-72
20. MUSKEGON												
Big Rapids	Muskegon River	Primary	10,100	90	82	Final Order adopted February, 1969.	yes	x		12-1-70	6-1-71	12-1-72
Cadillac	Clam River	Secondary 45	10,300	30	52	A Stipulation developed April 8, 1969.	yes	x		9-1-70	6-1-71	12-1-72
Evart	Muskegon River	Secondary	1,775	39	48	Voluntarily submitted plans September, 1969.	no					
Fremont	Darling Creek	Secondary TF	3,400	18	27	Stipulation developed March, 1969.	yes	x		9-1-70	6-1-71	12-1-72
Howard City	Tamarack Creek	Secondary L	1,000				no		x			
Marion	Middle Branch River	None	900			Notice to appear at Statutory Hearing April, 1970.	no					

Community	Receiving Waters	Treatment Provided	Population (1964 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans Approved	Start Construction	Compl
Muskegon	Muskegon River	Primary	51,000	83	61	Stipulation developed March, 1969.	yes	X		9-1-70	6-1-71	12-1-7
Muskegon Heights	Muskegon River	Secondary AS	19,900	23	21	Stipulation developed July, 1968.	yes	X		9-1-70	6-1-71	12-1-7
Newaygo	Muskegon River	Primary	1,450	106	62		no					
North Muskegon	Muskegon River	Primary	4,000	163	127	Stipulation developed June, 1968.	yes	X		9-1-70	6-1-71	12-1-7
Reed City	Muskegon River	Primary	2,180	272	178	Stipulation developed May, 1968.	yes	X		9-1-70	6-1-71	12-1-7
71 68.09												
Ada Township (Ada)	Thornapple River	Secondary L	500			Treatment considered adequate.	no					
Alpine Township	York and Mill Creeks	None	5,000			Have connected with Grand Rapids system.	yes	X				7-1-
Ashley	Ashley Drain	None	410			Court order amended 7-23-68, abate existing pollution by June 1, 1971.	no				6-1-68	6-1-
Belding	Flat River	Secondary L	5,000			Treatment considered adequate.	no					
Byron Township, Kent County	Grand River	Secondary L				Treatment considered adequate.	no					
Caledonia	Thornapple River	Primary ST	760			Final Order for secondary treatment adopted February, 1970.	no			7-1-71	10-1-71	12-1-7
Carson City	Fish Creek	Secondary L	1,200				no					
Casnovia	Bell Creek	None	371			Final Order adopted Sept. 15, 1969. Suit in Muskegon County Court, January 13, 1970.	no			6-1-69	4-1-70	5-1-7
Cedar Springs	Cedar Creek	Secondary L	1,770			Treatment considered adequate.	no					
Coopersville	Deer Creek	Secondary TF	1,600	73	72	plant overloaded	no					
Delhi Township	Grand River	Primary	5,000	127	87	Final Order adopted April, 1969.	yes	X		1-1-71	12-1-71	12-1-7

Community	Receiving Waters	Treatment Provided	Population (1969 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans Approved	Start Construction	Complete
Delta Township	Grand River	Secondary AS	7,640	21	12	Stipulation developed February, 1969.	yes	X		9-1-71	12-1-71	12-1-72
DeWitt	Looking-glass River	Primary	1,240	190	126		no					
DeWitt Township	Looking-glass River	None	7,000			Court Order adopted June 27, 1969. To begin construction March, 1970.	yes	X		8-1-69	3-1-70	3-1-71
Dimondale	Grand River	None	900			Stipulation developed December, 1969. To begin construction by 6-1-70.	no					
Edmore	Stoney Creek	Secondary L	1,200			Treatment considered adequate.	no					
East Lansing	Red Cedar River	Secondary AS	37,000	20	87	Stipulation developed August, 1969.	yes	X		6-1-71	12-1-71	12-1-72
Eaton Rapids	Grand River	Primary	4,300	234	145	Final Order adopted April 21, 1969.	yes	X		3-1-71	12-1-71	12-1-72
Fowler	Peet Creek	Secondary TF	860	66	37	Treatment considered adequate.	no					
Fowlerville	Red Cedar River	Secondary L	1,670			Treatment considered adequate.	no					
Gaines Township (Cutlerville)	Buck Creek	None				Connected to the Wyoming system.	yes			construction complete		
Gaines Township (Dutton)	Plaster Creek	None				Final Order adopted February, 1970.	no			12-1-70	5-1-71	12-1-71
Grand Haven	Grand River	Primary	11,700	71	58	Stipulation developed April, 1969.	yes	X		9-1-70	6-1-71	12-1-72
Grand Ledge	Grand River	Primary	6,600	111	88	Stipulation developed January, 1970.	yes	X		3-1-71	12-1-71	12-1-72
Grand Rapids	Grand River	Secondary AS	220,300	13	21	Stipulation developed June, 1969.	yes	X		9-1-70	6-1-71	12-1-72
Grandville	Grand River	Secondary AS	8,500	13	9	Stipulation developed July, 1969.	yes	X		9-1-70	6-1-71	12-1-72
Grant	Crockery Creek	Secondary TF	730	30	41	Treatment considered adequate.	no			3-1-71	12-1-71	
Greenville	Flat River	Primary	7,200	118	74	Stipulation developed April, 1969.	yes	X		12-1-70	6-1-71	12-1-72
Hastings	Thornapple River	Primary	7,000	166	118	Stipulation developed March, 1969.	yes	X		9-1-70	6-1-71	12-1-72

Community	Receiving Waters	Treatment Provided	Population (1969 est.)	Discharge Characteristics		Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS		PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review		
				5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l			Nutrient Reduction	New or Improved Treatment	Plans Approved	Start Construction	Complete
Hudsonville	Buttermilk Creek	None	3,250			Agreement to connect to Grandville by May, 1970.	yes	X				
Ionia	Grand River	Primary	6,750	50	72	Stipulation developed May 13, 1969.	yes	X		12-1-70	6-1-71	12-1-72
Jackson	Grand River	Secondary AS	48,500	8	16	Tertiary treatment program underway.	yes	X				
Kent City	Ball Creek	Secondary SF	620			Treatment considered adequate.	no					
Kent County Airport	Plaster Creek	Secondary L	5,000			Treatment considered adequate.	no					
Laingsburg	Looking-glass River	None	1,000			Final Order Adopted April 25, 1968.	no					
Lake Odessa	Little Thornapple River	Secondary TF	1,810	65	63	Final Order adopted August 29, 1967. Corrective program underway.	no			1-1-69	6-1-70	12-31-70
Lakeview	Tamarack Creek	Secondary L	1,130			Treatment considered adequate.	no					
Lansing	Grand River	Secondary AS	122,000	9	27	Stipulation developed August 1, 1969.	yes	X		3-1-71	12-1-71	12-1-72
Leoni Township, Jackson County	Grand River	None	5,000			Planning to join county system using spray irrigation. Construction to start by October 1, 1970.	yes	X				12-1-72
Leslie	Huntoon Creek	Primary	1,810	78	87		no					
Lowell	Grand River	Primary ST	2,600	73	32	Final Order adopted January 20, 1970.	yes	X		6-1-71	12-1-71	12-1-72
Lyons	Grand River	None	700				no					
Mason	Grand River	Secondary AS	5,000	3	8	Stipulation developed October, 1969.	yes	X		12-1-70	6-1-71	12-1-72
Michigan Reformatory (Ionia)	Grand River	Primary	2,500	156	78	Plan to connect with Ionia City system.	yes	X		3-1-71	12-1-71	12-1-72
Middleville	Grand River	Primary IT	1,200			Contracts awarded for land disposal.	no					
Nashville	Thornapple River	Primary	1,825		75		no					

Community	Receiving Waters	Treatment Provided	Population (1966 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	 Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	 New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans	 Start Construction	 Complete
Ottawa County (Grand Valley State College)	Grand River	Secondary L				Treatment considered adequate.	no					
Ovid	Maple River	None	1,900			Final Order adopted July 28, 1967.	no					
Paris Township (now City of Kentwood)	Plaster Creek	None	10,000			Connected with Grand Rapids system.	yes	X			construction complete	
Parma	McKay Brook and Sandstone Creek	None	800			Court Order upheld March 11, 1969, to begin construction by July 1, 1970.	no			8-1-69	7-1-70	3-1-71
Perry	Looking-glass River	None	1,400				no					
Pewamo	Stony Creek	None 400					no					
Pine Rest Hospital (Cutlerville)	Buck Creek	Secondary AS	500			Treatment considered adequate.	no					
Plainfield Township, Kent County	Grand River York & Mill Creeks and [illegible] Lake	None	12,000			Connected with Grand Rapids city system.	yes	X			construction complete	
Portland	Grand River	Primary	3,800	147	146	Final Order adopted April, 1969.	yes	X		12-1-70	8-1-71	12-1-72
Rockford	Rogue River	Primary	2,075	71	80	To connect with Grand Rapids system through Kent County Department of Public Works. Negotiations on rates underway.	yes	X			Interceptor completed November, 1969	
Sand Lake	Black Creek	Secondary L	395			Treatment considered adequate.	no					
St. Johns	Hayworth Creek	Secondary TF	5,900	13	30	Notice of Determination Jan., 1970, city to contest at hearing April, 1970.	yes	X				12-1-7[illegible]
Saranac	Lake Creek	Secondary L	1,100			Lagoon completed October 1, 1968.	no				September, 1967	10-1-68
Sparta	Nash Creek	Secondary TF	3,000	30	47	Voluntarily proceeding with construction.	yes	X			under construction	
Spring Lake	Grand River	Primary TF	2,060	114	84	Stipulation developed March 13, 1968.	yes	X		8-1-70	6-1-71	12-1-72

Community	Receiving Waters	Treatment Provided	Population (1964 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Discharge Characteristics Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	IMPROVEMENT NEEDS New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans	PROGRAM FOR REMEDIAL FACILITIES Start Construction	PROGRAM FOR REMEDIAL FACILITIES Complete
Stanton	Fish Creek	Secondary L	1,200			Treatment considered adequate.	no					
State Prison of Southern Michigan (Jackson)	Grand River	Secondary TF L	6,000	31	47	New lagoon system installed.	yes	x				
Vermontville	Thornapple River	None	800			Final Order adopted September 27, 1967.	no			9-1-68	12-1-69	12-1-70
Walker	Tallman Creek	None	8,270			Served by City of Grand Rapids.	yes	x				
Webberville	Red Cedar River	None	700			Final Order adopted January 17, 1968.	no					
Williamston	Grand River	Primary	2,218	146	80	Stipulation developed August, 1968.	yes	x		10-1-70	6-1-71	12-1-7[illegible]
Woodland	McArthur Drain and Woodland Drain	Primary TF	375	10	9	Final Order adopted January 28, 1968.	no					
Wyoming	Grand River	Secondary TF	52,0[illegible]	18	33	Stipulation developed September, 1969.	yes	x		1-1-71	6-1-71	12-1-72
22. BLACK (HOLLAND)												
Holland	Lake Macatawa	Primary	24,000	82	63	Stipulation developed March, 1968.	yes	x		9-1-71	6-1-71	12-1-72
Jamestown Township	Black River	None	600				no					
Zeeland	Black River	Secondary AS	3,000	9	23	Stipulation developed April, 1968.	yes	x		12-1-70	12-1-71	12-1-72
Zeeland Township, Ottawa County	Black River	None				Proceeding with voluntary program to update treatment.	no					
23. KALAMAZOO												
Albion	Kalamazoo River	Primary	12,000	77	67	Stipulation developed May, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Allegan	Kalamazoo River	Primary TF	5,000	140	107	Stipulation developed May, 1968.	yes	x		1-1-71	10-1-71	12-1-72
Battle Creek	Kalamazoo River	Secondary TF	40,700	98	68	Attorney General has been requested to reopen court decree to include phosphorus removal by December 1, 1972.	yes	x				
Bellevue	Battle Creek River	None	1,300			Final Order adopted December 16, 1966.	no			4-18-69	9-19-69	12-31-[illegible]

Community	Receiving Waters	Treatment Provided	Population (1968 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Discharge Characteristics Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	IMPROVEMENT NEEDS New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans	Start Construction	Complete
Charlotte	Battle Creek River	Secondary TF	8,100	43	116	Stipulation developed January, 1970.	yes	X		4-1-71	6-1-71	12-1-72
Concord	Kalamazoo River	None	1,000			Final Order adopted March 28, 1968.	no			[illegible]	5-1-70	12-1-70
Douglas	Kalamazoo River	Septic tanks tile fields	600				no					
Fennville	Mann Creek	Secondary L	706			Treatment considered adequate.	no					
Galesburg	Kalamazoo River	None	1,410			Final Order adopted September 21, 1966. Signed contract to connect to the Kalamazoo system.	no					
Hopkins	Rabbit River	None	560			Final Order adopted May 28, 1968.	no			[illegible]	4-1-70	4-1-71
Kalamazoo	Kalamazoo River	Secondary AS	84,200	18.6	82	Stipulation developed February, 1969.	yes	X		1-1-72	3-1-72	12-1-72
Marshall	Kalamazoo River	Primary	6,700	68	43	Stipulation developed March, 1969.	yes	X		3-1-70	6-1-71	12-1-72
Olivet	Indian Creek	Secondary L	1,185			Treatment considered adequate.	no					
Otsego	Kalamazoo River	Secondary TF	4,300	103	66	Stipulation developed June, 1968.	yes	X		9-1-70	6-1-71	12-1-72
Parchment	Kalamazoo River	Secondary TF	1,985	27	82	Treatment considered adequate.	no					
Plainwell	Kalamazoo River	Secondary TF	3,400	53	74	Final Order adopted March 3, 1966, updated March, 1969.	yes	X		3-1-71	12-1-71	12-1-72
Portage (part)	Kalamazoo River	Secondary AS	1,400	26	16	Now being served by Kalamazoo.	no					
Saugatuck	Kalamazoo River	Primary	926	177	182	Final Order adopted July 26, 1966.	no					
Spring Arbor	Kalamazoo River	Secondary L	700			Treatment considered adequate.	no					
Springfield	Kalamazoo River	Secondary TF	4,000			Connected to Battle Creek system.	yes	X				
Springport	Rice Creek	None	800			Final Order adopted May 28, 1968.	no			6-1-70	10-1-70	11-1-71
4. BLACK (SOUTH HAVEN)												
Bangor	Black River and Maple Creek	Secondary L	2,110			Treatment considered adequate.	no					
Bloomingdale	Black River	None	400			Final Order adopted May 28, 1968.	no			10-1-69	4-1-70	4-1-71

Community	Receiving Waters	Treatment Provided	Population (1968 est.)	Discharge Characteristics		Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS		PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review		
				5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l			Nutrient Reduction	New or Improved Treatment	Plans	Start Construction	Complete
South Haven	Black River	Secondary AS	6,400	12	13	Stipulation developed April, 1968.	yes	x		12-1-70	6-1-71	12-1-72
28. PAW PAW												
Benton Township (part)		Secondary AS	20,000			Treatment provided by City of Benton Harbor. Needs additional sewers and better pumping station.	yes					
Coloma	Paw Paw River	Primary	1,470	141	91		no					
Hartford	Paw Paw River	Primary	2,305	57	190	Final Order adopted March 4, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Lawrence	Paw Paw River	Primary	770				no					
Lawton	Paw Paw River	Secondary L	1,400			Treatment considered adequate.	no					
Paw Paw	Paw Paw River	Primary	3,100	236	118	Final Order adopted March, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Watervliet	Paw Paw River	Primary	1,820				no			3-1-71	12-1-71	12-1-72
29. ST. JOSEPH (MICH.)												
Andrews University, Berrien Springs	St. Joseph River	Secondary TF	2,100			Stipulation developed February, 1968.	yes	x		1-1-71	6-1-71	12-1-72
Benton Harbor and St. Joseph	St. Joseph River	Secondary AS	36,600	13	22	Stipulation developed May, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Berrien Springs	St. Joseph River	Primary	1,950	76	83	Stipulation developed March, 1968.	yes	x	x	12-1-70 12-1-70	6-1-71 6-1-71	12-1-72 6-1-72
Branch County Medical Facilities		Primary				Connected to the Coldwater system.	no					
Bronson	Swan Creek	Secondary TF	2,270	30	66	Stipulation developed May, 1968.	yes	x		9-1-70	6-1-72	12-1-72
Buchanan	St. Joseph River	Primary	5,600	62	63	Final Order adopted February, 1968.	yes	x	x	12-1-70 12-1-70	6-1-71 6-1-71	12-1-72 6-1-72
Cassopolis	Ground waters	Secondary L & SI	2,030				no					
Centreville	Prairie River	None	875			Final Order adopted May 20, 1968.	no			2-1-70	6-1-70	12-1-70
Coldwater	Coldwater River	Secondary TF	9,700	19	27	Stipulation developed July, 1968.	yes	x		1-1-71	3-1-71	12-1-72
Coldwater State Home and Training School	Hodd Creek	Secondary AS		13	14	Plan to join city or provide nutrient removal.	yes	x		3-1-71	12-1-71	12-1-72

Community	Receiving Waters	Treatment Provided	Population (1960 est.)	Discharge Characteristics 5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l	Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS Nutrient Reduction	New or Improved Treatment	PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review Plans	Start Construction	Complete
Constantine	St. Joseph River	Primary	1,710	106	121	Stipulation developed August, 1968.	yes	x		10-1-70	6-1-71	12-1-72
									x	12-1-70	6-1-71	6-1-72
Dowagiac	Dowagiac Creek	Primary	7,600	160	63	Stipulation developed June, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Eau Claire	Farmers Creek	None	586				no					
Glen Oaks Community College, Centreville	Prairie River	None				Order of Determination adopted April 28, 1966. New Order April 24, 1968.	no					
Hillsdale	St. Joseph River	Secondary TF	7,000	30	43	Stipulation developed March, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Jonesville	St. Joseph River	None	1,8[illegible]			Final Order adopted January 17, 1968, referred to Attorney General for enforcement.	no					
Litchfield	St. Joseph River	None	1,000			Final Order adopted January 17, 1968.	no			under construction		9-1-70
Niles	St. Joseph River	Primary	13,8[illegible]	67	68	Stipulation developed March, 1968.	yes	x		12-1-70	6-1-71	12-1-72
Quincy	Marble Lake	Primary	1,600	77	76		no					
Reading	Unnamed Drains	None	1,130			Final Order adopted July, 1967.	no				9-1-69	9-1-70
Stevensville	Hickory Creek	None	700			Final Order adopted May 26, 1967. Plan to connect with the St. Joseph system.	no			3-1-69	12-1-69	5-1-70
Sturgis	White Pigeon River	Secondary TF	8,900	39	62	Stipulation developed April, 1968.	yes	x		9-1-70	6-1-71	12-1-72
Three Rivers	St. Joseph River	Primary	7,092	58	60	Stipulation developed May, 1968.	yes	x		12-1-70	6-1-71	12-1-72
									x	12-1-70	6-1-71	6-1-72
Union City	St. Joseph River	Secondary L	1,670			Treatment considered adequate.	no					
Vicksburg	Portage Creek	Secondary TF	2,2[illegible]	35	31	Stipulation developed February, 1968.	yes	x		9-1-70	6-1-71	12-1-72
MISCELLANEOUS DRAINAGE AREAS												
Bridgman	Tanner Creek	Secondary L	1,450			Treatment considered adequate.	no					
Chikaming Township (Sawyer, Lakeside, Union Pier)	Galien River	None	2,132			Final Order adopted March 26, 1968.	yes			3-1-70	7-1-71	7-1-73

Community	Receiving Waters	Treatment Provided	Population (1968 est.)	Discharge Characteristics		Status and Abatement Action	Affect Lake Michigan Water Quality	IMPROVEMENT NEEDS		PROGRAM FOR REMEDIAL FACILITIES Staff objectives subject to Commission review		
				5-day BOD Effluent mg/l	Suspended Solids Effluent mg/l			Nutrient Reduction	New or Improved Treatment	Plans	Start Construction	Complete
Escanaba	Portage Creek	Secondary AS & TF	15,000	20	30	Stipulation developed February 3, 1969	yes	X		3-1-71	12-1-71	12-1-72
Galien	Galien River	None	750				no					
Harbor Pointe Association	Lake Michigan	Primary ST	800			Stipulation developed June, 1969.	yes	X	X	10-1-70	6-1-71	12-1-72
Harbor Springs	Lake Michigan	Primary FS	1,430			Stipulation developed April, 1969	yes	X	X	12-1-70	6-1-71	12-1-72
Lake Township	Painterville Drain	None	2,000			Corrected by upgrading individual systems.	no					10-30-67 (Completed)
New Buffalo	Galien River	Secondary AS	2,130	98	231	Final Order adopted March, 1969.	yes	X		3-1-70	6-1-70	12-1-72
New Buffalo Township (Union Pier area)	Galien River	None				Final Order adopted March 20, 1969.	yes			3-1-70	7-1-70	7-1-71
Onekama	Portage Lake	None	670			To appear at statutory hearing April, 1970.	no					
Petoskey	Lake Michigan	Primary CP	6,400	174	77	Stipulation developed March, 1969.	yes	X		12-1-70	6-1-71	12-1-72
									X	12-1-70	6-1-71	6-1-72
Suttons Bay	Lake Michigan	Secondary L	420			Treatment considered adequate.	no					
Three Oaks	Dear and Spring Creeks	None	1,800			Final Order adopted February 23, 1967.	no			3-1-69	12-31-69	12-31-70
Wequetonsing	Lake Michigan	Primary IT	1,000			Stipulation developed July, 1969.	yes	X	X	10-1-70	6-1-71	12-1-72

Abbreviations

FS	Fine Screen
CP	Chemical Precipitation
ST	Septic Tank
IT	Imhoff Tank
AS	Activated Sludge
TF	Trickling Filter
L	Lagoons
SF	Sand Filter
SI	Spray Irrigation

APPENDIX C

DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES COMMISSION

WASTE TREATMENT PLANT OPERATORS
Rules of Procedure
Rules 21 - 29

Filed with Secretary of State, January 26, 1970.

(By authority conferred upon the water resources commission by section 2 of Act No. 245 of the Public Acts of 1929, as amended, being section 323.2 of the Compiled Laws of 1948.)

R 323.21. Purpose.

Rule 21. Section 6 a of Act No. 245 of the Public Acts of 1929, as added by Act No. 209 of the Public Acts of 1968, being section 323.206a of the Compiled Laws of 1948, requires that every industrial or commercial entity which discharges liquid wastes into any public lake or stream shall have waste treatment facilities under the specific supervision and control of persons who have been certified by the water resources commission as being properly qualified to operate the facilities. These rules set forth the requirements for certification of such operators.

R 323.22. Definitions.

Rule 22. (1) "Board" means the board of examiners established by the commission.

(2) "Certificate" means a document issued by the commission attesting that a person is properly qualified to operate or supervise the operation of certain designated waste treatment facilities.

(3) "Commission" means the water resources commission, department of natural resources.

(4) "Owner" means an industrial or commercial entity which discharges liquid wastes into any public lake or stream.

(5) "Public lake or stream" means a lake or stream which is being used or is capable of being used by the public or contains fish which are the property of the public.

R 323.23. Classification of waste treatment facilities.

Rule 23. (1) Each waste treatment facility shall be classified by the commission as to type. The commission shall notify the owner of the waste treatment facility of its classification by issuing a certificate of classification. An owner who objects to the assigned classification may appeal to the commission in accordance with the commission's rules of procedure Upon appeal, the commission shall schedule a hearing and request the owner to present evidence to support his claim. After this hearing, the commission shall determine the proper waste treatment facility classification.

(2) Classifications shall be of 3 types, described as physical, chemical and biological. Each of these classifications shall be further sub-divided into at least 3 sub-classifications with the more complex facilities assigned the higher numbers.

EXAMPLES OF WASTE TREATMENT PLANT CLASSIFICATIONS

A. PHYSICAL

Sub-Classification No. 1

- Plain sedimentation
- Screening
- Spray pond
- Skimming
- Gravity separation
- Flotation
- Impoundment - regulated discharge

Sub-Classification No. 2

- Filtration
- Thermo control - cooling towers
- Incineration - land disposal
- Radioactivity monitoring
- Air flotation
- Gas stripping
- Centrifuging

Sub-Classification No. 3

- Wet oxidation
- Membrane filtration

B. CHEMICAL

Sub-Classification No. 1

- Sludge conditioning
- Neutralization
- Evaporation - condensation
- Adsorption
- Absorption

Sub-Classification No. 2

- Chemical coagulation
- Precipitation
- Emulsion breaking
- Ion exchange

Sub-Classification No. 3

Chemical oxidation - reduction
Chemical recovery

C. BIOLOGICAL

Sub-Classification No. 1

Extended aeration
Aerated lagoons
Natural stabilization basin

Sub-Classification No. 2

Disinfection
Trickling filters
Aerobic and anaerobic digestion

Sub-Classification No. 3

Activated sludge

R 323.24. Board of examiners.

Rule 24. The commission shall appoint a five-member board of examiners, of which 1 member shall be a member of the staff of the commission, 1 shall be a member of the staff of the Michigan department of public health, 1 shall be an owner of a commercial or industrial enterprise which operates a waste treatment facility or an employee of such an owner, 1 shall be a holder of a certificate to operate or supervise the operation of a waste treatment facility, and 1 shall be chosen at large. Of the members first appointed, 1 shall be appointed for a term of 1 year, 2 for terms of 2 years and 2 for terms of 3 years. Thereafter, each member shall be appointed for a term of 3 years. At its first meeting in each calendar year, the board shall select from its membership a chairman and such other officers as may be needed to conduct its business. Members of the board shall be reimbursed for their actual and necessary expenses in transacting board business.

R 323.25. Applications and examinations.

Rule 25. (1) A person desiring to be certified in 1 or more of the classifcations shall file an application with the commission at least 30 days before the established date of the examination on an application form provided by the commission. The information included therein shall constitute a part of the examination.

(2) The board shall, under the direction of the commission, examine applicants for certification in order to determine their ability and qualifications, at such times and places as it designates and in accordance with the provisions of these rules. Examinations shall be held at least annually. Sixty days notice of the examination date shall be given. The board, as a result of the examination and the requirements of the act, shall recommend to the commission the issuance or non-issuance of certificates.

(3) The commission may maintain reciprocal certification with other states.

R 323.26. Qualifications for certification.

Rule 26. (1) The board may recommend for certification, following an oral examination and such other examinations, including an evaluation of the applicant's experience, as the board may require, persons with the following qualifications:

(a) Minimum requirements - all types of classification no. 1:

(i) The ability to read and write.

(ii) Comprehension of the principles and problems of management of the treatment process and facilities.

(iii) The ability to perform arithmetic calculations necessary to operate the waste treatment facility and prepare the required report to the commission.

(b) Minimum requirements - all types of classification no. 2:

(i) The equivalent of a high school education with the equivalent of high school chemistry.

(ii) Comprehension of the principles and problems of management of the treatment process and facilities.

(iii) The ability to perform arithmetic calculations necessary to carry out the operation of the waste treatment facility and prepare the required report to the commission.

(c) Minimum requirements - all types of classification no. 3:

(i) The equivalent of 2 years of college education in engineering, chemistry, biological sciences or allied field. Graduation from high school and with at least 4 courses in post-high school level chemistry or biological sciences or both may be considered to be equivalent.

(ii) Comprehension of the principles and problems of management of the treatment process and facilities.

(2) The board may recommend for certification in an appropriate classification, without written examination, or with oral examinations at the board's option, persons having the following qualifications:

(a) Applicants who are registered professional engineers in Michigan and have at least 2 years experience in the water pollution control or waste treatment field.

(b) Applicants who have a bachelor of science or higher degree in engineering, chemistry, biological sciences, or allied field and have at least 3 years experience in the water pollution control or waste treatment field.

(c) Applicants who hold a classification no. 1 or 2 certificate, have at least 5 years experience in the water pollution control or waste treatment field, have proven their competence in their present classification, and have successfully completed advanced courses in 1 or more of the following: chemistry, biological sciences and waste treatment operation.

(3) Oral examinations, when held by the board, shall determine the overall knowledge of the applicant in regard to the operation of the type of facility the applicant will be responsible for, and the possible effects of discharge of untreated or inadequately treated waste upon the waters receiving the plant effluent.

(4) The commission may deny a certificate to a person who has given false information in his application or who has been guilty of fraudulent practices in his examination. This denial, or any other denial of a certificate, may be appealed from in accordance with the commission's rules of procedure.

R 323.27. Renewal and revocation of certificates.

Rule 27. (1) A certificate is valid for 5 years from the next July 1st after the date of issuance. On or after January 1 of the year in which a certificate expires, the certified person may apply for renewal thereof. The commission may waive re-examination if the certified operator's operation record justifies such exceptions. Failure to apply for renewal shall result in termination of such certification. The commission shall notify the certified operator and the owner as to the action it has taken.

(2) If the certificate of an operator is not renewed within 30 days after its renewal date, the commission shall give notice of the non-renewal to the owner and the operator and 30 days thereafter certification shall be terminated unless application for renewal has been received in the interim.

(3) The commission may revoke the certificate of a person, who after a hearing, is adjudged incompetent or unable to properly perform the duties of operator in his classification, or who has practiced fraud or falsification or who has been negligent in the discharge of his duties. Notice of revocation shall be given to the owner and to the person whose certification is being revoked.

R 323.28. Persons in responsible charge and changes.

Rule 28. (1) An owner shall designate a certified operator to be in responsible charge of the day-to-day operation of each waste treatment facility and shall inform the commission of the designation. The owner may replace the designated operator with another properly certified operator at any time and shall notify the commission within 10 days after the replacement.

(2) A certified operator who changes his address or place of employment shall notify the commission thereof within 30 days after the change.

R 323.29. Reports.

Rule 29. The person in responsible charge of a waste treatment facility shall file with the commission, each month or at such longer interval as the commission may designate, on forms provided by the commission, operating reports showing the effectiveness of the treatment facility operation and the quantity and quality of liquid wastes discharged into the public lake or stream. When the person in responsible charge is not available to file the report, the owner may appoint a substitute suitable to the commission to file the report.

APPENDIX D

MONTHLY SUMMARIES
OF
RAW WATER ANALYSES
BENTON HARBOR WATER TREATMENT PLANT
1969

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Protozoa												
Mean	34	31	117	54	57	12	36	45	35	21	9	0
Max.	90	54	216	126	108	36	72	144	72	54	36	0
Min.	0	0	0	0	18	0	0	0	18	0	0	0
Chlorophyceae												
Mean	25	40	54	18	72	39	54	235	365	126	57	42
Max.	72	108	90	90	18	90	108	594	756	234	108	72
Min.	0	0	0	0	0	0	18	36	126	108	18	18
Cyanophyceae												
Mean	114	105	54	8	3.6	3	2	3	--	54	3	0
Max.	198	162	90	18	18	18	18	18	--	270	18	0
Min.	18	18	36	0	0	0	0	0	--	0	0	0
Diatomaceae												
Mean	734	800	1,279	1,577	1,065	1,473	620	535	573	582	924	1,210
Max.	864	1,134	1,674	2,106	1,692	1,890	1,044	1,008	738	1,188	990	1,368
Min.	396	540	882	1,296	954	1,170	378	180	306	126	810	990
Alkalinity												
Mean	126	125	123	127	120	112	113	112	112	114	115	123
Max.	151	140	135	139	134	119	120	119	119	129	123	138
Min.	114	116	112	117	109	108	109	108	105	107	109	111
Hardness												
Mean	156	154	147	154	145	132	131	130	130	133	138	150
Max.	214	176	166	180	164	140	142	144	152	156	162	190
Min.	136	140	130	134	130	120	126	100	124	120	126	128
Turbidity												
Mean	9	7	6	13	5	4	4	4	5	10	10	14
Max.	24	12	15	28	9	7	13	14	21	28	26	22
Min.	3	3	2	7	3	2	2	2	3	3	3	7
Color												
Mean	9	14	8	17	8	6	5	5	4	7	5	10
Max.	20	24	13	30	14	11	12	13	10	18	12	19
Min.	5	7	2	8	5	3	3	3	2	2	3	5
Coliform (MPN)												
Mean	3,982	2,325	584	2,045	333	1,020	1,288	405	1,055	1,998	512	347
Max.	11,000	11,000	11,000	11,000	4,600	11,000	11,000	2,900	11,000	11,000	4,600	4,600
Min.	73	0	0	0	0	0	0	0	0	0	0	0
Calcium												
Mean	47.0	44.9	40.6	46.3	40.3	36.6	38.8	36.0	35.5	36.8	39.5	42.7
Max.	57.6	53.0	47.2	51.2	44.8	37.6	46.0	38.0	36.8	38.0	44.0	48.0
Min.	38.4	37.6	36.0	40.8	32.8	36.0	36.0	34.4	33.6	34.4	36.8	36.0
Magnesium												
Mean	13.3	11.7	11.3	11.2	11.0	9.8	9.0	10.4	10.7	9.6	9.9	11.2
Max.	17.0	12.6	12.2	12.6	12.6	10.7	11.2	13.1	12.2	11.0	11.2	17.0
Min.	10.2	10.7	10.2	9.2	9.7	8.7	6.3	8.8	9.2	8.2	7.8	7.0
Chloride												
Mean	11.0	11.0	10.0	11.0	10.0	9. 0	9.0	10.0	10.0	10.0	10.0	11.0
Max.	16.0	12.5	12.5	12.0	11.5	10.5	10.5	12.0	11.0	11.0	11.0	12.5
Min.	9.5	9.5	9.0	10.0	8.5	8.5	9.0	8.5	9.0	9.0	9.0	9.0
pH												
Mean	8.1	8.1	8.3	8.3	8.3	8.5	8.3	8.3	8.2	8.4	8.4	8.3
Max.	8.3	8.2	8.4	8.6	8.5	8.7	8.7	8.5	8.5	8.5	8.5	8.5
Min.	8.0	8.0	8.1	8.3	8.0	8.2	8.1	7.8	7.9	8.0	8.3	8.1

MONTHLY SUMMARIES
OF
RAW WATER ANALYSES
GRAND RAPIDS (LAKE MICHIGAN) WATER TREATMENT PLANT

1969

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Protozoa												
Mean	8	19	3	91	13	22	28	13	29	35	25	22
Max.	24	72	12	180	88	68	56	28	64	100	44	44
Min.	0	0	0	40	0	0	0	8	0	8	0	0
Chlorophyceae												
Mean	67	42	114	187	102	114	41	275	213	87	93	40
Max.	100	128	220	424	168	292	68	676	388	128	140	68
Min.	24	8	52	76	52	24	20	8	28	56	60	16
Cyanophyceae												
Mean	43	22	25	20	28	126	43	111	154	72	63	36
Max.	80	40	40	40	64	200	68	184	292	180	128	152
Min.	20	0	0	12	0	0	24	24	100	28	20	4
Diatomaceae												
Mean	660	449	991	1,579	1,474	907	1,192	467	240	224	545	658
Max.	1,008	760	1,740	2,956	3,040	1,424	1,652	1,276	378	412	1,128	1,638
Min.	388	216	336	784	400	476	456	172	96	108	188	236
Alkalinity												
Mean	118	117	114	122	117	112	111	110	109	108	110	112
Max.	128	127	128	140	124	118	119	118	115	115	118	122
Min.	112	110	109	112	111	108	108	107	103	105	105	106
Hardness												
Mean	146	145	140	148	141	135	133	130	130	130	132	138
Max.	168	171	160	170	150	150	144	136	140	138	146	154
Min.	136	132	130	134	134	126	130	126	126	124	129	122
Turbidity												
Mean	8.9	6.8	5.6	7.9	4.6	4.0	3.9	3.6	4.6	6.2	5.0	6.1
Max.	17.5	11.7	12.2	14.5	9.5	7.9	6.7	6.5	7.0	13.0	7.2	10.2
Min.	4.7	2.4	2.1	4.2	2.3	1.3	2.0	1.5	2.3	2.0	2.7	2.4
Color												
Mean	3.2	4	3.5	3	3.5	3	3	3	3	3	3	3
Max.	4	6	4	4	4	4	3	3	3	3	4	4
Min.	3	2	3	2	3	2	2	2	3	3	3	2
Coliform (MPN)												
Mean	415	569	59	351	45	36.2	516	171	31.8	209.6	96	54.4
Max.	2,400	2,400	460	2,400	460	460	2,400	2,400	150	2,400	460	1,100
Min.	23	3.6	0	3.6	0	3.6	9.1	11	3.6	3.6	3.6	0
Calcium												
Mean	37.9	42.0	36.2	40.1	37.6	26.2	35.2	34.6	36.2	35.5	36.0	36.5
Max.	39.2	45.6	36.8	42.4	38.4	38.4	36.0	36.0	36.8	36.8	36.8	40.0
Min.	36.8	38.4	35.2	38.4	36.8	34.4	34.4	31.2	34.4	34.4	35.2	36.8
Magnesium												
Mean	11.4	12.1	10.8	11.7	11.3	10.8	11.0	10.4	10.7	10.8	10.4	10.7
Max.	12.1	14.1	11.7	13.1	11.7	11.7	11.7	10.7	11.7	11.2	11.2	11.2
Min.	10.7	10.7	10.2	10.7	10.7	10.2	10.2	10.2	10.2	10.2	10.2	10.2
Chloride												
Mean	10	13	10	11	9.5	8	8	8	8.5	8	9	9
Max.	11	17	10	12	10	10	9	9	9	10	10	10
Min.	9	11	9	10	9	8	7	8	8	7	8	8
pH												
Mean	8.1	8.1	8.3	8.2	8.3	8.2	8.1	8.2	8.2	8.3	8.3	8.2
Max.	8.3	8.3	8.7	8.6	8.6	8.6	8.5	8.7	8.6	8.6	8.6	8.5
Min.	8.0	7.9	8.1	8.1	8.1	7.9	7.8	7.6	7.7	8.1	8.2	8.1

APPENDIX E

CONSTRUCTION GRANT PROGRAM

STATUS of GRANT OFFERS and DEVELOPMENTS SINCE FEBRUARY MEETING

A. Projects from June 27, 1968 Priority List

1. Since the February meeting 6 offers of State grants or advances have been made as follows:

Van Buren County (Decatur)	$ 145,427
Monroe County (Monroe Twp.)	86,275
Genesee County (Vienna Twp.)	51,998
Genesee County (Clayton Twp., et al)	429,885
Genesee County (Mt. Morris Twp.)	322,660
Benton Harbor	219,074
TOTAL	$1,255,319

2. To date, offers of State grants and advances totalling $59,843,499 have been made for 48 projects.

B. Projects Eligible for Additional Grant Funds (Construction commenced after June 30, 1967)

1. Since the February meeting 12 offers of State grants or advances have been made as follows:

Detroit	$1,116,250
Howard City	28,202
Vernon	25,224
Genesee County (Fenton)	29,014
Norway	95,625
Sparta	111,349
Kent City	23,650
Carson City	42,202
Potterville	45,588
Big Rapids	145,623
Saranac	46,464
Lakeview	9,436
TOTAL	$1,718,627

2. To date offers of State Grants or advances totalling $12,649,344 have been made for 30 projects.

C. To date commitments totalling $72.5 million have been made from the Water Pollution Control Fund.

D. Grants for Collecting Sewers, Calendar Year 1969

1. Since the February meeting 7 grant offers totalling $2,215,362 have been made as follows:

Vermontville	$ 151,145
Macomb County	
(Chesterfield Twp.)	703,700
(Harrison Twp.)	562,300
Perry	242,774
Jonesville	180,254

Hillsdale County (Litchfield)	244,289
Allegan County (Hopkins)	130,900
TOTAL	$2,215,362

2. To date, grant offers totalling $4,278,299 have been made for 18 projects. This amount also represents the total commitment from the State Sewer Construction Fund.

E. The first vouchers for partial payment of grants from the Water Pollution Control Fund were initiated on March 6, 1970. To date, vouchers have been processed and payments authorized for the following projects:

Wayne County (Huron-Sumpter-Flat Rock Inter.)	$ 274,100
Wayne County (Flat Rock STP additions)	64,700
Kent County (North Kent Sew. Disp. Sys.)	363,257
Kent County (Monroe Ave. Inter.)	166,875
Oakland County (Clinton-Oakland Inter.)	3,409,090
TOTAL	$4,278,022

Presentation of Checks to the above listed applicants were made by Governor Milliken on March 18, 1970.

F. On February 26, 1970, the legislature, by concurrent resolutions, approved in their entirety the lists of sewage treatment works and collecting sewer projects, submitted by the Commission on January 15, 1970. Staff is proceeding as rapidly as possible to certify eligible projects for grants.

Letters have been mailed to all applicants notifying them of the legislature's action and of our proceedures leading up to tendering of grant offers.

G. On February 27, 1970, the City of Warren and Ted Bates, its major, filed fuit in the U. S. District Court against the Secretary of the Interior, the Federal Water Pollution Control Administration, the Department of Natural Resources and the Water Resources Commission. Among other things, the suit contested the constitutionality of the Clean Water Bond Act and implementing legislation as well as the Commission's administration of the grant program.

Following several meetings of the City of Warren and State officials, including one meeting with Governor Milliken, the City agreed to withdraw that part of its suit contesting the constitutionality of the bond issue. The constitutionality issues were settled yesterday afternoon, March 17, 1970, when the Court issued a partial consent order.

As a result of the suit, the proposed sale of Recreation and Clean Water bonds scheduled for March 17, 1970 had to be cancelled and the Municipal Finance Commission had to delay approval of several local bond issues for projects involving State bond funds. The way is now cleaned for these matters to proceed.

The remaining issues in this case will be settled in accordance with established court procedures.

APPENDIX F

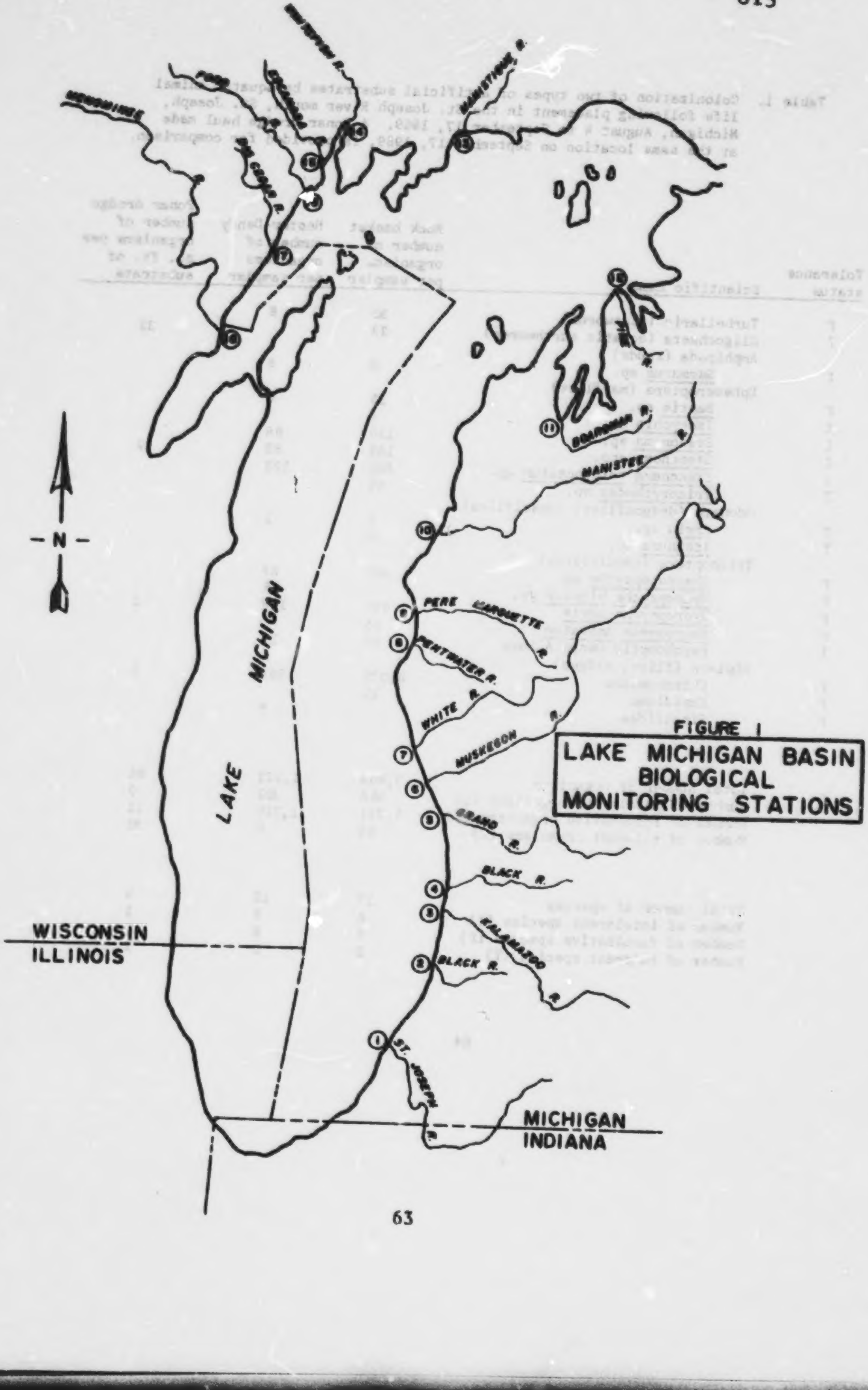
MENOMINEE
FORD
ESCANABA
WHITEFISH R.
MANISTIQUE R.
BOARDMAN R.
MANISTEE
PERE MARQUETTE R.
PENTWATER R.
WHITE R.
MUSKEGON R.
GRAND R.
BLACK R.
KALAMAZOO R.
BLACK R.
ST. JOSEPH R.
N
LAKE MICHIGAN
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
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FIGURE 1
LAKE MICHIGAN BASIN BIOLOGICAL MONITORING STATIONS

Table 1. Colonization of two types of artificial substrates by aquatic animal life following placement in the St. Joseph River mouth, St. Joseph, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)	30	8	
T	Oligochaeta (aquatic earthworms)	23		32
	Amphipoda (scuds)			
I	*Gammarus* sp.	8	8	
	Ephemeroptera (mayflies)			
F	*Baetis* sp.	15	8	
I	*Isonychia* sp.	1		
I	*Stenonema* sp. A	120	68	
I	*Stenonema* spp.	165	83	2
I	*Stenonema tripunctatum* gp.	660	128	
F	*Tricorythodes* sp.	45		
	Odonata (dragonflies, damselflies)			
F	*Argia* sp.	1	1	
T	*Ischnura* sp.	30		
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.	285	83	
F	*Hydropsyche bicolor* gp.		15	
F	*Hydropsyche orris*	495	128	2
F	*Macronemum zebratum*	15		
I	Psychomyiid Genus A Ross	15	15	
	Diptera (flies, midges)			
F	Chironomidae	6,030	968	9
F	Empididae	15		
F	Simuliidae		8	
	Total number of organisms	7,953	1,521	45
	Number of intolerant organisms (I)	969	302	2
	Number of facultative organisms (F)	6,931	1,219	11
	Number of tolerant organisms (T)	53	0	32
	Total number of species	17	13	4
	Number of intolerant species (I)	6	5	1
	Number of facultative species (F)	9	8	2
	Number of tolerant species (T)	2	0	1

Table 2. Colonization of two types of artificial substrates by aquatic animal life following placement in the Black River mouth, South Haven, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
	Coelenterata (hydras)			
F	*Cordylophora lacustris*	trace		
F	Turbellaria (flatworms)	180	144	
T	Oligochaeta (aquatic earthworms)	276	78	78
	Gastropoda (snails, limpets)			
F	*Ferrisia* sp.		12	
F	*Helisoma* sp.	6	6	
T	*Physa* sp.		6	
F	Cladocera (water fleas)	24		
	Amphipoda (scuds)			
I	*Gammarus* sp.	12	6	
	Odonata (dragonflies, damselflies)			
T	*Ischnura* sp.	18	6	
	Trichoptera (caddisflies)			
F	*Hydropsyche* sp.		6	
I	*Polycentropus* sp.		6	
	Diptera (flies, midges)			
F	Chironomidae	162	210	25
	Pisces (fish)			
F	*Ambloplites rupestris*	2		
	Total number of organisms	680	480	103
	Number of intolerant organisms (I)	12	12	0
	Number of facultative organisms (F)	374	378	25
	Number of tolerant organisms (T)	294	90	78
	Total number of species	9	10	2
	Number of intolerant species (I)	1	2	0
	Number of facultative species (F)	6	5	1
	Number of tolerant species (T)	2	3	1

Table 3. Colonization of two types of artificial substrates by aquatic animal life following placement in the Kalamazoo River mouth, Saugatuck, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)	16	14	
F	Nematoda (roundworms)	16		2
T	Oligochaeta (aquatic earthworms)		2	27
	Gastropoda (snails)			
F	*Ferrisia* sp.	16	2	
	Amphipoda (scuds)			
I	*Gammarus* sp.	1,072	232	5
F	*Hyalella azteca*	592	90	
I	*Pontoporeia affinis*	720	132	
	Ephemeroptera (mayflies)			
F	*Caenis* sp.	16		
I	*Stenonema* sp.	16		
	Odonata (damselflies)			
F	Coenagrionidae	128	32	
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.	112	6	4
I	Leptoceridae	16		
I	Psychomyiid Genus A Ross	192	44	2
F	Chironomidae (true midges)	1,680	412	30
T	*Chironomus* sp.			2
F	Ceratopogonidae (biting midges)			4
	Total number of organisms	4,592	946	76
	Number of intolerant organisms (I)	2,016	408	7
	Number of facultative organisms (F)	2,576	538	40
	Number of tolerant organisms (T)	0	2	29
	Total number of species	13	10	8
	Number of intolerant species (I)	5	3	2
	Number of facultative species (F)	8	6	4
	Number of tolerant species (T)	0	1	2

Table 4. Colonization of two types of artificial substrates by aquatic animal life following placement in the Black River mouth, Holland, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
	Coelenterata (hydras)			
F	*Cordylophora lacustris*	VA	A	
T	Oligochaeta (aquatic earthworms)		1	133
	Amphipoda (scuds)			
I	*Gammarus* sp.	328	176	
F	Hydracarina (water mites)	1		
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.	6		
I	Psychomyiid Genus A Ross	7	3	
	Diptera (flies, midges)			
F	Chironomidae	78	68	28
	Total number of organisms	420	248	161
	Number of intolerant organisms (I)	335	179	0
	Number of facultative organisms (F)	85	68	28
	Number of tolerant organisms (T)	0	1	133
	Total number of species	6	5	2
	Number of intolerant species (I)	2	2	0
	Number of facultative species (F)	4	2	1
	Number of tolerant species (T)	0	1	1

Table 5. Colonization of two types of artificial substrates by aquatic animal life following placement in the Grand River mouth, Grand Haven, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969 is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)	5	3	
F	Nematoda (roundworms)		1	
T	Oligochaeta (aquatic earthworms)	10	2	175
	Gastropoda (snails, limpets)			
F	*Gyraulus* sp.		1	
T	*Physa* sp.		2	
	Amphipoda (scuds)			
I	*Gammarus* sp.	10	85	2
	Decapoda (crayfishes)			
F	*Orconectes propinquus*	2		
	Odonata (dragonflies, damselflies)			
T	*Ischnura* sp.		1	
	Trichoptera (caddisflies)			
F	*Hydropsyche* sp.	1		
I	Psychomyiid Genus A	2	9	
	Diptera (flies, midges)			
F	Chironomidae	207	260	2
	Total number of organisms	237	364	179
	Number of intolerant organisms (I)	12	94	2
	Number of facultative organisms (F)	215	265	2
	Number of tolerant organisms (T)	[illegible]	5	175
	Total number of species	7	9	3
	Number of intolerant species (I)	2	2	1
	Number of facultative species (F)	4	4	1
	Number of tolerant species (T)	1	3	1

Table 6. Colonization of two types of artificial substrates by aquatic animal life following placement in the Muskegon River mouth, Muskegon, Michigan, August 5 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
	Coelenterata (hydras)			
F	*Cordylophora lacustris*	tr	tr	
T	Oligochaeta (aquatic earthworms)	1	1	
	Gastropoda (snails, limpets)			
F	*Ferrisia* sp.		1	
	Amphipoda (scuds)			
I	*Gammarus* sp.	42	3	51
I	*Pontoporeia affinis*			4
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.	2	7	
	Diptera (flies, midges)			
F	Chironomidae	28	39	
	Total number of organisms	73	51	55
	Number of intolerant organisms (I)	42	3	55
	Number of facultative organisms (F)	30	47	0
	Number of tolerant organisms (T)	1	1	0
	Total number of species	5	6	2
	Number of intolerant species (I)	1	1	2
	Number of facultative species (F)	3	4	0
	Number of tolerant species (T)	1	1	0

Table 7. Colonization of two types of artificial substrates by aquatic animal life following placement in the White River mouth near Whitehall, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969 is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
	Coelenterata (hydras)			
F	*Cordylophora lacustris*	A	VA	
F	Turbellaria (flatworms)	1	1	
T	Oligochaeta (aquatic earthworms)	1		2
	Amphipoda (scuds)			
I	*Gammarus* sp.	848	62	2
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.		4	
I	*Hydroptila* sp.	6	11	
	Diptera (flies, midges)			
F	Chironomidae	217	61	
	Total number of organisms	1073	139	4
	Number of intolerant organisms (I)	854	73	2
	Number of facultative organisms (F)	218	66	0
	Number of tolerant organims (T)	1	0	2
	Total number of species	6	6	2
	Number of intolerant species (I)	2	2	1
	Number of facultative species (F)	3	4	0
	Number of tolerant species (T)	1	0	1

Table 8. Colonization of two types of artificial substrates by aquatic animal life following placement in the Pentwater River mouth, Pentwater, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms pe sq. ft. of substrate
	Coelenterata (hydras)			
F	*Cordylophora lacustris*		tr	
F	Turbellaria (flatworms)	5	3	
T	Oligochaeta (aquatic earthworms)			35
	Gastropoda (snails, limpets)			
T	*Physa* sp.	1		
F	*Pleurocera acuta*	3		
	Isopoda (sow bugs)			
T	*Asellus militaris*		1	
F	Cladocera (water fleas)	1		
	Amphipoda (scuds)			
I	*Gammarus* sp.	176	198	7
	Decapoda (crayfishes)			
F	*Orconectes virilis*	2		
	Ephemeroptera (mayflies)			
I	*Stenonema interpunctatum* sp.	2		
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.		8	
	Diptera (flies, midges)			
I	*Atherix variegata*	2	7	2
F	Chironomidae	874	528	18
	Total number of organisms	1,066	745	62
	Number of intolerant organisms (I)	180	205	9
	Number of facultative organisms (F)	885	539	18
	Number of tolerant organisms (T)	1	1	35
	Total number of species	9	7	4
	Number of intolerant species (I)	3	2	2
	Number of facultative species (F)	5	4	1
	Number of tolerant species (T)	1	1	1

Table 9. Colonization of two types of artificial substrates by aquatic animal life following placement in the Pere Marquette River mouth, Ludington, Michigan, August 4 to September 17, 1969. A Ponar dredge haul made at the same location on September 17, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
	Coelenterata (hydras)			
F	Cordylophora lacustris	VA		
F	Turbellaria (flatworms)	1	4	4
	Bryozoa (moss animals)			
F	Plumatella repens		tr	
T	Oligochaeta (aquatic earthworms)	38	8	97
	Gastropoda (snails, limpets)			
F	Ferrisia sp.	1		
	Pelecypoda (clams)			
T	Pisidium sp.			2
T	Spaerium sp.			7
	Amphipoda (scuds)			
I	Gammarus sp.	304	96	14
I	Pontoporeia affinis	8		
	Decapoda (crayfishes)			
F	Orconectes propinquus	2		
	Odonata (dragonflies, damselflies)			
T	Ischnura sp.	1		
	Trichoptera (caddisflies)			
F	Cheumatopsyche sp.			2
I	Polycentropus sp.		1	
	Diptera (flies, midges)			
F	Chironomidae	104	76	23
	Total number of organisms	459	185	149
	Number of intolerant organisms (I)	312	97	14
	Number of facultative organisms (F)	108	80	29
	Number of tolerant organisms (T)	39	8	106
	Total number of species	9	6	7
	Number of intolerant species (I)	2	2	1
	Number of facultative species (F)	5	3	3
	Number of tolerant species (T)	2	1	3

Table 10. Colonization of two types of artificial substrates by aquatic animal life following placement in the Manistee River mouth, Manistee, Michigan, August 4 to September 18, 1969. A Ponar dredge haul made at the same location on September 18, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
	Bryozoa (moss animals)			
F	*Cristatella mucedo*	A		
	Gastropoda (snails, limpets)			
F	*Ferrisia* sp.		1	
	Pelecypoda (clams)			
T	*Pisidium* sp.		1	
	Amphipoda (scuds)			
I	*Gammarus* sp.	360	264	
	Ephemeroptera (mayflies)			
I	*Stenonema interpunctatum* sp.	2	1	
	Diptera (flies, midges)			
F	Chironomidae	5	6	2
	Total number of organisms	367	273	2
	Number of intolerant organisms (I)	362	265	0
	Number of facultative organisms (F)	5	7	2
	Number of tolerant organisms (T)	0	1	0
	Total number of species	4	5	1
	Number of intolerant species (I)	2	2	0
	Number of facultative species (F)	2	2	1
	Number of tolerant species (T)	0	1	0

Table 11. Colonization of two types of artificial substrates by aquatic animal life following placement in the Boardman River mouth, Traverse City, Michigan, August 5 to September 19, 1969. A Ponar dredge haul made at the same location on September 19, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)	120	126	
T	Oligochaeta (aquatic earthworms)	138	204	
	Hirudinea (leeches)			
T	*Helobdella fusca*		6	
	Gastropoda (snails, limpets)			
F	*Ferrisia* sp.		30	
	Isopoda (sow bugs)			
T	*Asellus militaris*	108	252	
	Odonata (dragonflies, damselflies)			
T	*Ischnura* sp.	24	24	
	Diptera (flies, midges)			
F	Chironomidae	588	234	7
	Total number of organisms	978	876	7
	Number of intolerant organisms (I)	0	0	0
	Number of facultative organisms (F)	708	390	7
	Number of tolerant organisms (T)	270	486	0
	Total number of species	5	7	1
	Number of intolerant species (I)	0	0	0
	Number of facultative species (F)	2	3	1
	Number of tolerant species (T)	3	4	0

Table 12. Colonization of two types of artificial substrates by aquatic animal life following placement in the Pine River mouth, Charlevoix, Michigan, August 5 to September 19, 1969. A Ponar dredge haul made at the same location on September 19, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)			2
T	Oligochaeta (aquatic earthworms)	1		94
	Hirudinea (leeches)			
T	*Glossiphonia stagnalis*			2
	Pelecypoda (clams)			
T	*Pisidium* sp.			5
	Isopoda (sow bugs)			
T	*Asellus militaris*		10	
	Amphipoda (scuds)			
I	*Crangonyx* sp.			39
I	*Gammarus* sp.	37	10	
F	*Hyalella azteca*	12		5
	Decapoda (crayfishes)			
F	*Orconectes virilis*	2		
	Ephemeroptera (mayflies)			
F	*Caenis* sp.			5
I	*Stenonema interpunctatum* gp.		3	
I	*Stenonema tripunctatum*		3	
I	*Stenonema* sp.		2	
	Trichoptera (caddisflies)			
F	*Cheumatopsyche* sp.		1	
I	*Neureclipsis* sp.	17	20	21
I	*Polycentropus* sp.	5	4	
	Diptera (flies, midges)			
F	Ceratopogonidae			5
F	Chironomidae	16	4	27
	Pisces (fish)			
F	*Cottus ricei*	2		
	Total number of organisms	91	57	205
	Number of intolerant organisms (I)	58	42	60
	Number of facultative organisms (F)	32	5	44
	Number of tolerant organisms (T)	1	10	101
	Total number of species	8	9	10
	Number of intolerant species (I)	3	6	2
	Number of facultative species (F)	4	2	5
	Number of tolerant species (T)	1	1	3

Table 13. Colonization of two types of artificial substrates by aquatic animal life following placement in the Manistique River mouth, Manistique, Michigan, August 5 to September 18, 1969. A Ponar dredge haul made of the same location on September 18, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)	1	1	
T	Oligochaeta (aquatic earthworms)	2	1	A
	Gastropoda (snails, limpets)			
F	*Ferrisia* sp.	1	1	
T	*Physa* sp.		1	
	Amphipoda (scuds)			
I	*Crangonyx* sp.	6	19	
I	*Gammarus fasciatus*	2	1	
F	*Hyalella azteca*	1		
I	*Pontoporeia affinis*		1	
	Decapoda (crayfishes)			
F	*Orconectes virilis*		1	
	Ephemeroptera (mayflies)			
I	*Paraleptophlebia debilis*	1		
I	*Stenonema interpunctatum* gp.	2		
	Trichoptera (caddisflies)			
I	*Polycentropus remotus*?	1	6	
	Diptera (flies, midges)			
F	Chironomidae	2	12	
	Total number of organisms	19	44	--
	Number of intolerant organisms (I)	12	27	--
	Number of facultative organisms (F)	5	15	--
	Number of tolerant organisms (T)	2	2	--
	Total number of species	10	10	1
	Number of intolerant species (I)	5	4	0
	Number of facultative species (F)	4	4	0
	Number of tolerant species (T)	1	2	1

Table 14. Colonization of two types of artificial substrates by aquatic animal life following placement in the Whitefish River mouth, Rapid River, Michigan, August 5 to September 17, 1969.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler
T	Oligochaeta (aquatic earthworms)		1
	Gastropoda (snails, limpets)		
F	*Pleurocera acuta*	1	1
	Ephemeroptera (mayflies)		
F	Baetidae (early instars)	2	
F	*Centroptilum* sp.	2	
I	*Ephemerella* sp.	4	1
I	*Paraleptophlebia* sp.	1	1
I	*Stenonema femoratum*	1	
I	*Stenonema interpunctatum* gp.	14	3
I	*Stenonema* nr. *lunatum*	6	
I	*Stenonema tripunctatum*		2
	Trichoptera (caddisflies)		
I	*Polycentropus* sp.	8	4
	Diptera (flies, midges)		
F	Chironomidae	2	4
	Total number of organisms	41	17
	Number of intolerant organisms (I)	34	11
	Number of facultative organisms (F)	7	5
	Number of tolerant organisms (T)	0	1
	Total number of species	10	8
	Number of intolerant species (I)	6	5
	Number of facultative species (F)	4	2
	Number of tolerant species (T)	0	1

Table 15. Colonization of two types of artificial substrates by aquatic animal life following placement in the Escanaba River mouth, Escanaba, Michigan, August 6 to September 16, 1969.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler
T	Oligochaeta (aquatic earthworms)	1	2
	Decapoda (crayfishes)		
F	*Orconectes virilis*	1	
	Ephemeroptera (mayflies)		
I	*Paraleptophlebia* sp.	1	
	Trichoptera (caddisflies)		
I	*Polycentropus* sp.	27	23
I	Psychomyiid Genus A Ross	2	2
	Diptera (flies, midges)		
F	Chironomidae	23	39
	Total number of organisms	55	66
	Number of intolerant organisms (I)	30	25
	Number of facultative organisms (F)	24	39
	Number of tolerant organisms (T)	1	2
	Total number of species	6	4
	Number of intolerant species (I)	3	2
	Number of facultative species (F)	2	1
	Number of tolerant species (T)	1	1

Table 16. Benthic animal life found in qualitative collections from the Ford River mouth, Ford River, Michigan, September 16, 1969. Relative abundance of organisms is indicated by VA (very abundant, > 25), A (abundant, 11-24), C (common, 6-10), O (occasional, 2-5), and P (present, 1).*

Tolerance status	Scientific name	Qualitative collection
T	Oligochaeta (aquatic earthworms)	P
	Hirudinea (leeches)	
T	*Haemopsis* sp.	P
	Gastropoda (snails, limpets)	
F	*Campeloma* sp.	P
T	*Physa* sp.	O
F	*Pleurocera acuta*	O
	Isopoda (sow bugs)	
T	*Asellus militaris*	C
	Amphipoda (scuds)	
I	*Gammarus* sp.	O
F	*Hyalella azteca*	O
	Decapoda (crayfishes)	
F	*Orconectes propinquus*	P
F	*Orconectes virilis*	O
	Plecoptera (stoneflies)	
I	*Acroneuria internata*	O
	Ephemeroptera (mayflies)	
F	*Centroptilum* sp.	O
I	*Siphlonurus* sp.	P
I	*Stenonema interpunctatum* gp	O
I	*Stenonema* nr. *lunatum*	O
	Odonata (dragonflies, damselflies)	
F	*Aeschna* sp.	O
F	*Basiaeschna* sp.	O
I	*Calopteryx* sp.	O
F	*Epiaeschna* sp.	O
T	*Ischnura* sp.	P
	Hemiptera (true bugs)	
F	Corixidae	O
F	*Ranatra* sp.	O
	Trichoptera (caddisflies)	
I	*Polycentropus* sp.	P
	Coleoptera (beetles)	
F	*Gyrinus* sp.	P
	Diptera (flies, midges)	
F	Chironomidae	C
	Pisces (fish)	
I	*Etheostoma nigrum nigrum*	O
F	*Lepomis cyanellus*	C
F	*Pimephales notatus*	O
	Total number of species	28
	Number of intolerant species	9
	Number of facultative species	15
	Number of tolerant species	5

*Artificial substrates were vandalized and the substrate was too rocky for a Ponar dredge sample.

Table 17. Colonization of two types of artificial substrates by aquatic animal life following placement in the Cedar River mouth, Cedar River, Michigan. August 6 to September 16, 1969. A Ponar dredge haul made at the same location on September 16, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)	1	3	
T	Oligochaeta (aquatic earthworms)	1		2
	Gastropoda (snails, limpets)			
T	*Physa* sp.	1		
	Isopoda (sow bugs)			
T	*Asellus militaris*	5	1	
	Amphipoda (scuds)			
I	*Gammarus* sp.		7	
F	*Hyalella azteca*	1		
	Decapoda (crayfishes)			
F	*Orconectes virilis*	2		
	Ephemeroptera (mayflies)			
I	*Paraleptophlebia* sp.	6	4	
I	*Stenonema interpunctatum* gp.	8	3	
I	*Stenonema* nr. *lunatum*	1		
I	*Stenonema tripunctatum*	7	3	
	Odonata (dragonflies, damselflies)			
F	*Enallagma* sp.	1		
T	*Ischnura* sp.	2	1	
	Trichoptera (caddisflies)			
I	*Polycentropus* sp.	12	4	
	Coleoptera (beetles)			
F	*Stenelmis* sp.			2
	Diptera (flies, midges)			
F	Chironomidae	1	6	25
	Total number of organisms	49	32	29
	Number of intolerant organisms (I)	34	21	0
	Number of facultative organisms (F)	6	9	27
	Number of tolerant organisms (T)	9	2	2
	Total number of species	14	9	3
	Number of intolerant species (I)	5	5	0
	Number of facultative species (F)	5	2	2
	Number of tolerant species (T)	4	2	1

Table 18. Colonization of two types of artificial substrates by aquatic animal life following placement in the Menominee River mouth, Menominee, Michigan, August 6 to September 16, 1969. A Ponar dredge haul made at the same location on September 16, 1969, is provided for comparison.

Tolerance status	Scientific name	Rock basket number of organisms per sampler	Hester-Dendy number of organisms per sampler	Ponar dredge number of organisms per sq. ft. of substrate
F	Turbellaria (flatworms)		1	
T	Oligochaeta (aquatic earthworms)		4	9
	Gastropoda (snails, limpets)			
F	*Ferrisia* sp.		1	
	Diptera (flies, midges)			
F	Chironomidae	2		
	Total number of organisms	2	6	9
	Number of intolerant organisms (I)	0	0	0
	Number of facultative organisms (F)	2	2	0
	Number of tolerant organisms (T)	0	4	9
	Total number of species	1	3	1
	Number of intolerant species (I)	0	0	0
	Number of facultative species (F)	1	2	0
	Number of tolerant species (T)	0	1	1

F. B. Frost

MR. FROST: In regard to Recommendation No. 1 concerning 80 percent reduction of total phosphorus, on February 5, 1968, letters were sent to all municipalities which have wastewater treatment plants discharging to the surface waters of the State. The letter transmitted a copy of the Resolution adopted by the Water Resources Commission in October 1967 calling for removal of phosphorus compounds from waste discharges by June 1, 1977. It also pointed out that June 1, 1977, was an outside date for meeting the objective and that earlier compliance should be sought wherever possible.

On June 3, 1968, letters were sent to communities of 2,000 population or larger within the Lake Michigan Basin advancing the date for phosphorus removal to December 1972 in conformance with the Secretary's recommendation. Those communities within the basin,and discharging to interstate waters, were also apprised of the need to provide secondary treatment by June 1, 1972, unless it can be demonstrated that a lesser degree of treatment or control will provide for water quality enhancement commensurate with present and proposed future uses as defined by the Federal-State interstate water quality standards.

Formal Stipulations were sent to communities which responded favorably to the requests for improved treatment. The Stipulations formalize an orderly study, design and construction program with performance dates consistent with the Secretary's recommendation. Communities not proceeding voluntarily have appeared before the Commission and Orders of Determination have been adopted against all of these with populations greater than 2,000 except Ludington, Battle Creek, Manistique and St. Johns. Notices of Determination and Hearing have been adopted for Ludington and St. Johns and they appeared before the Commission for a hearing at the March 1970 meeting. Manistique appeared before a Hearings Commissioner in October 1969 and his recommendations were received on February 23, 1970. A hearing on his report will be held at the April 1970 Commission meeting. The Commission has requested the Attorney General to reopen a previous court action concerning Battle Creek to add phosphate removal to the present court ordered treatment requirements.

In regard to industrial waste treatment, Recommendation No. 2, Appendix A includes a description of the type of waste treatment provided by industries, the status of their treatment, and any abatement action being taken against these industries. There are currently five industries listed which affect Lake Michigan water quality and all five are proceeding satisfactorily with abatement programs.

A recent amendment to Act 245, Public Acts of 1929, requires that every industrial or commercial entity which discharges liquid wastes into any public lake or stream shall have waste treatment facilities under control of operators certified by the Commission. The rules of certification are contained in Appendix C.

Recommendation No. 3 regarding treatment needs.

Appendices A and B have been prepared in further response to Recommendations 1, 2 and 3. These list all industrial and municipal waste effluent dischargers within the Lake Michigan Basin and summarize information on the type of discharge, effect on Lake Michigan waters, improvement needs and the program for remedial action where such is needed. The lists are revised editions of those originally submitted to the Chairman by letter dated October 31, 1968. Additions to the list are indicated by an "ADD". Deletions are indicated by "DEL".

Recommendation No. 4 for a continuous disinfection of sewage effluents.

In January 1967, a policy was adopted by the Michigan Department of Public Health requiring year-round disinfection of waste effluent from all municipal treatment plants prior to discharge to the surface waters of the State. This program is in full force and effect at all such communities within the Lake Michigan Basin.

Recommendation No. 5 and Recommendation No. 14, both on collection needs.

Act 228, Public Acts of 1967, is an act to regulate the subdivision of land, and to promote the public health by providing authority to the Michigan Department of Public Health to approve subdivision developments not served by public sewers, contingent on the suitability of soils. This program has already had a beneficial effect in accelerating municipal collection and disposal systems in nearby developing areas, and preventing use of septic tank-tile field systems in unsuitable areas.

Act 329, Public Acts of 1966, as amended establishes authority to provide State grants for sewage treatment facilities in conjunction with Federal grants under United States Public Law 84-660, as amended. Pertinent provisions of Act 329 dealing with unified waste collection and treatment programs are as follows:

"Sec. 7. Effective July 1, 1968, a grant shall not be made until the local agency's governing body has adopted and submitted to the water resources commission a comprehensive long-range plan for the control of pollution in the area within its jurisdiction, hereinafter referred to as the official plan. If more than 1 local agency has authority to provide service for sewage collection in the same area, the required plan may be submitted jointly by the local agencies concerned or by 1 local agency with the concurrence of the others.

"Sec. 8. An official plan shall:

(a) Provide for timely construction of sewage treatment facilities which will prevent the discharge of untreated or inadequately treated sewage or other wastes as defined by Act No. 245 of the Public Acts of 1929, as amended, being sections 323.1 to 323.12a of the Compiled Laws of 1948, into the waters of the State.

(b) Provide for adequate planning, zoning, population projections and engineering and economic studies to delineate with all practicable precision those portions of the area which public sewerage systems may reasonably be expected to serve within 10 years, and within 20 years, and any areas in which the provision of such services is not reasonably foreseeable.

(c) Be in compliance with the State pollution control plan required by United States Public Law 84-660, as amended.

(d) Set forth a time schedule and proposed method of financing, construction and operation of the pollution control system.

(e) Be reviewed by the official planning agencies having jurisdiction within the local agency, including the regional planning agency, if any, for consistency with programs of planning for the area, which reviews shall be transmitted to the water resources commission with the plan.

"Sec. 10. (1) The water resources commission may approve the official plan as submitted or, if it finds the plan to be inconsistent with proper local or regional water pollution control, it may return the plan for appropriate modification. Where more than 1 local agency is involved in an official plan and the local agencies are unable to agree upon an official plan which the commission will approve, the commission shall develop the necessary official plan.

"(2) The commission may provide technical assistance to local agencies in coordinating official plans.

"(3) The commission shall cooperate with all appropriate Federal, State, interstate and local agencies and with appropriate private organizations."

Recommendation No. 6 regarding overflow devices and Recommendation No. 7 concerning combined sewer separations.

In its supervisory capacity over municipal waste collection and treatment systems, the Michigan Department of Public Health continues to promote the most effective utilization of these systems. Adjustable regulating devices at points of combined overflow are one of a number of techniques utilized to make use of system storage capacities and minimize combined overflows.

In Michigan's water quality standards program and plan of implementation, the Commission has developed a policy wherein all new sewerage systems are to be developed on the basis of separate sewers for stormwater and sanitary wastewaters. Whenever feasible, separated sanitary wastewater systems are not to be discharged into existing combined systems. If such a discharge does occur, control facilities must be developed on the combined system to provide for enhancement of the receiving water quality commensurate with present and proposed future water uses and to be consistent with the requirements of State law. In those areas where noncompliance with the standards is determined to exist as the result of overflows of sanitary wastewater in storm runoff, the Commission is requiring the best practicable treatment or control no later than June 1, 1977. The Commission is presently directing its attention to certain major metropolitan areas where problems of this type are known to exist.

With regard to Recommendation No. 8 for the discharge of treatable industrial wastes into municipal sewer systems.

Michigan has had a long-standing program that encourages the discharge of industrial wastes to municipal collection and treatment systems where such wastes are compatible or can be made compatible by pretreatment. The Kalamazoo area is a good example of a recent program of this type where paper mills within and around the city discharge treated or untreated deinking wastes and whitewater waste effluent to the city's activated sludge treatment plant. Since the second reconvened conference, all deinking waste and all whitewater except for that from two mills has been connected to the city system. This particular program has had a dramatic effect in upgrading the quality of the Kalamazoo River.

Recommendation No. 9 concerning the continuous disinfection of industrial effluents.

It is recognized that certain industries may have wastes of public health significance as illustrated by bacteriological testing procedures. Where such a public health hazard can be anticipated or be shown to exist, disinfection of the waste is required prior to discharge.

Recommendation No. 11 regarding the prohibition of the dumping of polluted material into Lake Michigan.

As reported to the Chairman by letter dated October 31, 1968, Act 247, Public Acts of 1955, as amended, authorized the former Department of Conservation to regulate the deposition of materials on State bottom lands. All requests for deposition of materials on such bottom lands are evaluated to determine, prior to the issuance of a permit, whether the material to be deposited contains substances which will cause pollution.

Recommendation No. 13 regarding the rules and regulations for controlling wastes from watercraft.

As previously reported, the Michigan Water Resources Commission in January 1968 adopted a rule to control pollution from marine toilets on watercraft. The rule does not allow the macerator-chlorinator and does authorize the use of holding tanks or incinerators. The rule became effective January 1, 1970, and public acceptance of this program has generally been encouraging. Private marina operators are beginning to install pump-out stations and treatment facilities where needed and the Michigan Waterways Commission has accelerated its program to provide similar facilities at State harbors of refuge on the Great Lakes. Forty-eight private and seventeen State-assisted marinas or harbors are planning or have already installed pump-out stations and treatment facilities where needed.

Recommendation No. 15 regarding a Technical Committee on pesticides.

Act 233, Public Acts of 1959, as last amended by Act 91, Public Acts of 1968, provides for the licensing of persons engaged in the business of applying pesticides and economic poisons out of doors, with the licensing program being administered by the Director of the Michigan Department of Agriculture. The act further establishes an Advisory Committee to consult with and aid the Director in the administration of the act. The Committee is composed of representatives of the Department of Public Health, Department of Natural Resources, the Aeronautics Commission, the Water Resources Commission, and the Pesticide Research Center of Michigan State University.

Michigan has been officially represented at all meetings of the Technical Committee and is acting on all of its recommendations. A Federal grant was awarded on October 1, 1969, for pesticide monitoring of the Michigan portion of the Great Lakes Basin, to be done in accord with recommendations of the Committee.

Recommendation 18 regarding inventory of sites of potential major spills of oil or other hazardous materials.

A list of potential oil spill sites and other hazardous materials was submitted to the Chairman by letter of October 31, 1968, and was included as Appendix I for the second session of the reconvened conference. This list remains unchanged.

Recommendation No. 19 arranged for a broad spectrum of water quality analyses at Benton Harbor and Grand Rapids.

Water quality analysis programs have been expanded to comply with the Secretary's recommendation, at the cities of Benton Harbor and Grand Rapids. Data for 1969 at these two stations is summarized in the attached Appendix D. Daily analytical data is available and can be furnished upon request.

For additional programs.

In addition to the programs undertaken to implement the recommendations of the conferees and continuing programs described in the first session of the conference on pollution of Lake Michigan and its tributary basins, the Water Resources Commission has initiated several other programs to abate pollution and enhance water quality.

Michigan's Clean Water Bond Program.

In November 1968 Michigan electors authorized the sale of $335 million worth of bonds for purposes of assisting communities in improving existing and constructing new waste treatment plants.

In June 1969 the Michigan State Legislature passed implementing legislation to provide for spending $285 million of the bond proceeds for sewage treatment works and intercepting sewers. In July 1969 implementing legislation was passed to authorize the use of the remaining $50 million for grants to assist in financing construction of collecting sewers.

A priority list of projects has been developed and has been approved by the Commission and the Legislature. At each monthly meeting of the Commission a report is presented which lists changes in the status of grant offers and developments since the previous month's meeting and summarizes all action to date. The report submitted at the March 1970 meeting is included in Appendix E.

Algal Monitoring of Waters Along Lake Michigan Shoreline.

Samples were collected biweekly from 20 stations along the Lake Michigan shoreline during the summer recreation season (June to September) of 1969 to provide qualitative and quantitative algal data. Chemical and physical analyses of water samples were collected concurrently with the algal samples. These samples were collected in conjunction with an existing program for monitoring the bacterial quality of Michigan's Great Lakes beaches which was described in Chapter V, Part 3 of the "Report on Water Pollution Control in the Michigan Portion of the Lake Michigan Basin and Its Tributaries" presented at the first Lake Michigan conference. Data from both the algal and bacterial programs are now stored in STORET. The program will be repeated during the summer of 1970. Further continuation is dependent upon funding.

Tributary Monitoring.

The tributary monitoring program described in Chapter V, Part 8 of the report submitted to the first conference still includes the 12 stations near the mouths of Lower Peninsula tributaries to Lake Michigan but now also includes 7 Upper Peninsula tributaries to Lake Michigan. Samples are now collected on a monthly basis. Data from this program is being placed in STORET.

Pesticide Monitoring.

A Federal Water Pollution Control Administration grant for $40,000 was awarded to the Water Resources Commission on October 1, 1969, for pesticide monitoring of the Michigan portion of the Great Lakes Basin, staff has been hired, the chemical laboratory is being enlarged and additional equipment has been ordered.

A study initiated in October 1968 to monitor pesticide runoff from an area treated with dieldrin and chlordane for control of Japanese beetles is continuing as part of this project. A report on our findings is ready for release and a paper on the subject will be presented at the Great Lakes Research Conference, April 2, 1970.

The monitoring program and attendant analytical capabilities will provide an excellent mechanism to identify other water contaminants of current concern such as polychlorinated biphenyls, mercury, and 2, 4, 5-T. Other purposes of the monitoring program are to determine the pesticide budget of Lake Michigan and to identify pesticide sources to the Great Lakes. The project is scheduled to terminate on September 30, 1970.

A status report will be presented at this third session of the reconvened conference by Carlos Fetterolf, Chief of Water Quality Appraisal Section of the Commission for Dr. Donald Mount--I will have to change that. Status report has been presented by Carlos Fetterolf.

Thermal monitoring.

Revised thermal standards were submitted to the Commission at a public hearing held during the March 1970 meeting. This hearing will be held open for a 30-day period.

Staff of the Commission have conducted investigations of all major sources of thermal inputs to the Great Lakes in the last two years. The six powerplants that discharge to Lake Michigan were surveyed. Two additional surveys are planned for the summer of 1970 at locations where new powerplant discharges will be located.

Industries with thermal discharges are being required (in Orders) to conduct pre- and post-operative surveys in the vicinity of their discharges. Four of the six powerplants that discharge or will discharge to Lake Michigan have hired consultants to conduct investigations.

Biological Monitoring of Tributaries of Lake Michigan.

In early August 1969 two types of artificial substrate samplers, a rock basket and a Hester-Dendy, were placed in the mouths of 18 Michigan rivers tributary to Lake Michigan (Figure 1 of Appendix F). These substrates provided a suitable environment for colonization by stream macroinvertebrates and were removed after six weeks of exposure. At the time of artificial substrate retrieval Ponar dredge hauls from the river bottoms were made for comparative data. Preliminary results of species identifications and tabulations of colonizing organisms found on the artificial substrates and in Ponar dredge hauls are provided in Tables 1-18 of Appendix F.

Mr. Chairman, that completes the Michigan report.

MR. STEIN: Thank you very much.

Are there any comments or questions?

Let's go to Mr. Purdy.

MR. PURDY: Mr. Frost, I believe in Appendix B, the table for Michigan's municipal wastewater discharge inventory, that there is a correction to be made under the one column and that is the Program for Remedial Facilities and its stated Staff objectives subject to Commission review, and this was true a year ago.

MR. FROST: That is right.

MR. PURDY: But the line "Staff objectives subject to Commission review" should be eliminated.

MR. FROST: This should be deleted, yes. This is Commission action now.

MR. PURDY: This table includes detailed time schedules for plans approved, start of construction, and completion of the construction. In our own schedules we also have a time for preliminary plans.

MR. FROST: Yes.

MR. PURDY: I am wondering if you can tell the conferees the status of the preliminary plans approval. How many communities are we dealing with and how many have had preliminary plans approval?

MR. FROST: I think the list lists some 90 communities of over 2,000 population which we are dealing with and have formal agreements with, and of those 90 at least 60 have their preliminary plans in and approved at this time.

MR. PURDY: Yes.

One other point that I would like to make before we open this up to questions. At some later point in time if the performance schedules listed in this present table would be compared with the same listing presented at the second session, you will see that nine dates have been extended and that those dates pertain to the plans approval for seven.Two of them have a final completion date extended from 1970 into 1971. So it will be completed within the requirements of December 1972.

In addition to the 9 dates that have been extended, 38 dates for performance on plans approval have been shortened.

Those are the only comments that I have, Mr. Chairman.

MR. STEIN: Are there any other comments or questions?

MR. KLASSEN: I have one, Mr. Chairman. Possibly it is because I had a little difficulty in following some of these tables.

But I wanted to raise a question concerning a situation of which I have personal knowledge because it is my home town. I might not be welcome back there, but I want to raise this point.

It concerns Grand Haven, Michigan. Program for Remedial Facilities, plans approved September 1970. Actually shouldn't you say you hope to approve these 1970? Nevertheless, with construction completed December 1972.

What concerns me is that you have a statement here that this affects Lake Michigan; they have primary treatment. I know as well as the people from Michigan that while this does not discharge directly into Lake Michigan, it is a very short distance up the river, because the town is on the river, and while it is not classified as a direct discharge, for all practical purposes it goes into Lake Michigan. We have some industries that discharge into watercourses or sewers that are farther away than the Grand Haven discharge.

There is no statement in here about chlorination at Grand Haven, but it does say that it affects Lake Michigan, to which I will subscribe and agree.

Now, back on page 23, I will tell you what concerns me about the Eagle Ottawa Leather Company. They are a hide tanning company and they only provide screening. They are discharging 1.4 million gallons of water a day with a BOD of 16,000 pounds, suspended solids of 24,000 pounds. And while I know we get concerned about that, we are concerned, as I reported at Abbott Laboratories where they now have a 42 parts per million of BOD and they should have 40; we are concerned about that. But the next thing that concerns me is, "Additional treatment under study. May join the city." And the Eagle Ottawa Leather Company outlet is--you might not be able to see it, but it is within a few blocks of the municipal outlet, yet you say that it does not affect Lake Michigan. Now, either the municipal plant does not affect Lake Michigan or the Eagle Ottawa Leather does affect Lake Michigan. Quite frankly I am not trying to pick Michigan's report to pieces except to say that had I stated or one of the other States stated that we have an industry in Illinois where additional treatment is under study and they may join the city, I think we would probably have got cut to pieces on it.

I don't know how many other instances there are like this, but I for one can't quite accept this lack of treatment. I know the industry and they are affecting Lake Michigan, although it says "No" here. I am not too sure what the city of Grand Haven is doing about developing a financial plan to even prepare plans for their construction, and if Eagle Ottawa Leather Company is going to join the city, may join the city, when are they going to decide? Because if the plans are to be approved in September, it would seem that right now they ought to be making some plans to join the city.

I know this might sound like nitpicking, but it involves a policy, again, that is being followed by all of the other States. And as I said this morning, we can sit back in Illinois and be pretty smug because we only have a small amount of this, but I happen to know this situation is why I brought it up.

MR. PURDY: During the course of your speech you asked a number of questions and I am not sure that I can remember all.

MR. KLASSEN: I can restate them.

MR. PURDY: But starting with number 1--

MR. STEIN: He said with the leather company it is not all clear.

MR. PURDY: Well, starting with I think the first one on chlorination, on page 9 of the report, Recommendation No. 9, it is stated that--no, not 9, but it is stated in the report the policy of the Michigan Department of Public Health that was implemented in January of 1969, I believe.

MR. FROST: 1967.

MR. PURDY: In 1967.

MR. FROST: Recommendation 4.

MR. PURDY: Recommendation No. 4. "In January

1967 a policy was adopted by the Michigan Department of Public Health requiring year-round disinfection of waste effluent from all municipal treatment plants prior to discharge to the surface waters of the State. This program is in full force and effect in all such communities within the Lake Michigan Basin."

MR. KLASSEN: Is Grand Haven following this policy?

MR. PURDY: Grand Haven is in the Lake Michigan Basin, I believe, and I have stated that all communities in the Lake Michigan Basin are following that policy.

MR. KLASSEN: Then what you are saying, that Grand Haven is chlorinating the year-round?

MR. PURDY: I am saying that Grand Haven and all the other communities in the Lake Michigan Basin are chlorinating year-round.

MR. KLASSEN: O. K. I won't argue the point, but I could.

MR. PURDY: Now, on the basis of Grand Haven and "affecting Lake Michigan water quality," you will notice that the X is under the Nutrient Reduction. We state that Grand Haven affects the Lake Michigan water quality with relationship to nutrients and certainly the completion date is 12-1 of 1972, this has not been met yet as of the present time but this is the program, and in the same way that the plan date has not been met, but it has not expired yet. It is required under the enforceable stipulation by 9-1 of 1970.

We do not say that the Eagle Ottawa Leather Company affects Lake Michigan because it does not discharge nutrients that contain significant quantities of phosphorus. Within this report we are including under Appendix F sampling at the mouths of the various rivers, including the Grand River. In our original report and available to the conferees through monitoring program we have sampling for dissolved oxygen, BOD, and other substances at the mouth of the Grand River; and in my judgment these samples do not show that the BOD that is discharged, biochemical oxygen demanding substances discharged, at Eagle Ottawa or at Grand Haven affect the dissolved oxygen in Lake Michigan.

If there is information to indicate that this is so, I would appreciate having it and would make it available to the Commission for action.

MR. KLASSEN: Following that line of reasoning, then, if it is not, why is the industry going to put in treatment?

MR. PURDY: Because we have a problem within the intrastate waters that requires treatment.

MR. KLASSEN: In the intrastate waters for about probably less than a mile from the lake are you requiring this industry to do this?

MR. PURDY: That mile is valuable river mileage to Michigan and we require the protection of this.

MR. KLASSEN: I don't want to belabor this, but on page 23, "Affects Lake Michigan Water Quality," under Eagle Ottawa Leather Company you have got this checked "No." In other words, in your opinion, the wastes of Eagle Ottawa Leather Company, treatment of which is merely fine screening, and 24,000 pounds of suspended solids a day going in about a mile from the lake, do not affect the lake? If you say so, I will accept your statement.

MR. PURDY: I said so.

MR. STEIN: Any other comments or questions?

What are those two communities that you extended the date on for completion?

MR. PURDY: The two communities were--

MR. FROST: Chikaming.

MR. PURDY: Chikaming Township.

MR. STEIN: What? How do you spell it?

MR. PURDY: Chikaming, C-h-i-k-a-m-i-n-g, Township, a total population within the township of 2,000.

New Buffalo, a population of 2,130.

MR. STEIN: All right. O. K.

Any further comments or questions?

If not, thank you very much for your report, which was pretty extensive. I think we got this full view.

Are there any other people for Michigan?

MR. PURDY: I have received, Mr. Stein, a telegram or a partial telegram that was addressed to Mr. Mayo from William Bopf of the city of Holland, and he indicates that a full telegram will follow and I would like to have this telegram made a part of the record when received by Mr. Mayo.

MR. STEIN: Well, if it is received. How long do you want us to keep the record open?

MR. PURDY: You should have it within the next couple of days, I would imagine, on the telegram.

MR. STEIN: We will keep the record open for a couple of days. A couple is two.

MR. PURDY: All right.

(Which said telegram is as follows:)

IT'S TULIP TIME IN HOLLAND EVERY YEAR IN MAY

City of Holland

HOLLAND, MICHIGAN

OFFICE OF THE CITY MANAGER
WILLIAM L. BOPF, CITY MANAGER

March 30, 1970

Mr. Francis T. Mayo, Regional Director
U. S. Department of the Interior
Federal Water Pollution Control
Administration
Great Lakes Region
33 East Congress Parkway, Room 410
Chicago, Illinois 60605

Dear Mr. Mayo:

The City of Holland will be unable to send a representative to the forthcoming reconvened conference regarding pollution of Lake Michigan and its tributary basin. However, there is considerable interest in this matter and the city would like the following comments to be noted at that hearing

1. Certain lands immediately adjacent to Lake Macatawa which immediately borders Lake Michigan have been the recipient of dredging, resulting in the reclamation of lands which now substantially benefit the community.

2. There are additional sites available which can still receive dredgings and further reclaim other valuable land.

3. The channel in Lake Macatawa is of vital concern to the residents of Holland and several businesses immediately adjacent to the waterfront.

We wish to strongly indicate that the City of Holland is in favor of continued dredging operations in the channel leading from Lake Macatawa to Lake Michigan and in Lake Macatawa to continue the use of this facility by ocean-going vessels. We would strongly support any legislation or regulations which would allow the continuance of further dredging operations. Further, we invite representatives from the Corps of Engineers to visit with us at their convenience in order to show them the existing dredging disposal sites and contemplated future areas.

We look forward to hearing from you in the future on this matter and visiting with your representative.

Very truly yours,

William L. Bopf

William L. Bopf,
City Manager

WLB/d
cc: Mayor Bosman
Seymour Padnos

MR. PURDY: I have not received any requests from other Michigan residents to present a statement here today and I would like to ask if we have anyone that would like to present a statement?

I see no one holding up their hand, Mr. Stein, so that completes the presentation here.

I would like to make one comment with respect to the interim dates that you have suggested to other communities. Our Commission has made it a practice to require three dates in all of its orders, that is the final plans approval, initiation of construction, and final completion date. When we are embarking upon a new area of treatment, such as phosphorus removal, we have put in preliminary plan dates. So those four dates are readily available and can be submitted.

From the standpoint of retaining engineers, again since some 60 have had their preliminary plans approved, I don't think this is a real significant date from our standpoint. And on the financing requirement, again this is not a date that the Commission has felt would aid them in their enforcement procedures and so we have no financing date requirement formally established.

Other than those two, though, we can give you the information very readily and have given it to you.

MR. STEIN: Right.

Now, I am not sure I don't agree with you on the engineering date, but at least with the municipalities I found, at least in my experience, that the financing date is the most important one. Because once they have arranged for financing, everything moves ahead, because if they don't construct time is running against them.

But I don't look for any difficulty in getting all the dates that presumably are required by the Department. Some people think that some dates are more important than the others.

In other words, I don't think from all the States that we are going to have any trouble getting these seven steps. That is the retention of engineers--and obviously if they have had preliminary reports they have got the engineers--submit engineering report, initiate detailed engineering plans and specifications, submit detailed engineering specifications, arrange financing, initiate construction, complete construction and place in fulltime operation. We recognize that this list or the completion of it may vary from State to State, because obviously all four States have different procedures, but by uniformity in reporting we can check all these.

All right. Are there any other people who want to say something who haven't come up?

If there is anyone who wants to come up, let him stand up. Come on.

EDWARD JACKSON
CITIZEN
MILWAUKEE, WISCONSIN

MR. JACKSON: I would just like to thank you for giving me an opportunity to speak before you on a subject that I and many other Americans are deeply concerned about and that is water pollution.

MR. STEIN: Pardon me. Would you identify yourself for the purpose of the record to start?

MR. JACKSON: All right. Edward Jackson, an employee of the Pfister Hotel, the seventh floor. It isn't often I get a chance to stand up here like this.

I would just like to say that, as I said, I would like to thank you for giving me an opportunity to speak before you on a subject that I and all Americans are very deeply concerned about and that subject is water pollution.

Pollution of our streams, lakes and rivers, it must cease; it must stop now, for the very existence of human life depends on pollution control. If we as a Nation have such great minds and so much money that we can send men to the moon and outer space, I am sure that pollution control here on earth will be a very simple problem.

We must attack the problem now. We must not hesitate. We must do it now, not tomorrow. We must start with all effort and all the resources that we have, for it is not the present generation that I look at, but it is your kids and my kids. There will be no place to go swimming; there will be no place to fish. There will not be any wildlife as we have now, as we know it; it will never be.

For myself, I love camping, I love hunting and I love fishing. And I was quite disturbed. I went up to Lake Superior last summer. I went up to Lake Erie to see that the lake is really no more. There isn't any lake because you can't swim in the lake; you certainly can't fish in the lake, because the fish aren't edible.

Thank you. (Applause.)

MR. STEIN: Thank you, Mr. Jackson. Are you just working here or are you going to school too?

MR. JACKSON: No, I am sorry, I wish I were going to school.

MR. STEIN: Right. O. K.

MR. KLASSEN: Mr. Chairman, could I seriously ask him a question?

MR. STEIN: Yes.

MR. KLASSEN: Let me preface it by saying that I have stated there is no way to minimize water pollution and air pollution. But I have wondered--and I am serious about this--wondering whether in our total environment there are problems that affect more people that might have a higher priority than water pollution, and I have referred to the possibility of a higher priority on cleaning up some of our slums and ghettos and providing good housing for people.

I just wondered--I am serious, because you are obviously a person who has given a lot of thought to this--

do you feel in your own mind that water pollution is the top priority for our funds and environmental control? I really would like your opinion.

MR. JACKSON: I would like to answer that. I would say priority is the priority of human life. If we have money that we can waste on defense contracts, kickbacks, as you know and I know, certainly we have money to take care of the housing and the money to take care of water pollution control. (Applause.)

MR. KLASSEN: I agree with you. I agree with you. Thank you.

MR. STEIN: Thank you very much.

You know, a lot of people have raised this question, Mr. Klassen. As long as you raised it, let me give you my view.

You know, that is what a lot of people through the years--and this is a good situation--have called the "Rockefeller syndrome." Everyone said, "If Rockefeller gave enough dimes away everyone would be happy, but if he gave all of his fortune away in dimes everyone would just have a dime."

The point is we are not living in a vacuum, as as far as I can see. And Mr. Klassen, I do not see the automotive engineers, the guys who are running TV stations, the guys who are putting out detergents, unguents, salves and putting out improved filters on cigarettes indicating that education and the ghettos have a higher priority. In my opinion, unless we do the job that faces us and push forward and clean up the environment, there isn't any assurance there is going to be money to put into these other reforms you feel might have a higher priority. It seems to me that only in water pollution control do we get a reluctance to push our own thing forward and we point to the other areas that might have a higher priority.

Let me give you my fundamental view. I think the problem of education is going to be solved in this country. I think the problem of ghettos is going to be solved in this country. I think the problems of race relations and integration are going to be solved in this country. But any one of those solutions is not going to be worth a damn if we kill the environment so we can't live in it, and I place this second to no priority in the world.

Summary

Is there any comment or question?

Is there anyone else who wants to speak?

We have had some very involved and excellent reports coming forward here. I believe the general appraisal is that the program for the cleanup is moving forward apace, and we have probably as complicated, involved situation as anywhere in the country. The detailed reports we have gotten from the various States indicate both the progress and the deficiencies in the program in startling clarity.

I do think when we develop, as we will, this report on these seven points that have been sent to me from the Department, we may get a format which would satisfy everybody. This may contain more information than some people think is necessary. But I don't think anyone can then say that we don't have information which he believes is pertinent.

I have again been instructed by the Department to repeat what I have indicated before--that we consider the protection of Lake Michigan to have absolute priority consideration, as evidenced by the President's meeting with the Governors and the Secretary. We intend to have these conferences at 6 months' intervals. I think, as these things happen in their fortuitous way sometimes, we are planning to have the next conference in Michigan, either Grand Haven or Grand Rapids, if we have to go there, which is just 20 miles away, but Michigan will have the brass ring the next time.

In addition, we will have executive sessions plus workshops in the interim, and I am suggesting that in about a month we set a mutually-acceptable date for the conferees to get together, 1) to have this compliance list settled, and 2) to attempt to, at that time, evolve a thermal requirement for the lakes which can be adopted by the conferees and which can be incorporated by the four States in the water quality standards and accepted by the Secretary. It seems to me that we are not looking at this realistically unless we expect that the Federal Government will have a single thermal pollution standard or thermal quality standard for all four States bordering Lake Michigan. I think that the States would want that themselves. If we get together in a preliminary fashion or have the staffs do that, I am sure we can accomplish these two jobs in a month.

Unless I hear a dissent, I will try to arrange a mutually-accepted place for an executive session of the conference to consider both of these points and any other points which you might want to consider at that time.

On the basis of the information that we have received here, it seems that while the record is very, very good, our function is to get after the laggards and see if we can have a 100 percent record. We have found on the basis of the information here--and I don't say this is exclusive or complete--that the following municipalities and industries are not in compliance with the conference recommendations:

Illinois municipalities, none.

Illinois industries: United States Steel, Waukegan; United States Steel, South Works, Chicago.

Indiana municipalities: Ashley, Goshen, Lagrange, Ligonier, South Bend, Elkhart.

Indiana Industries: Angola Reduction Company in Angola; Gentner Packing Company, South Bend; Lehman Veal & Poultry Packers, Wakarusa; Middlebury Cooperative Creamery, Inc., in Middlebury; Penn-Central Transportation Corporation,

Summary

Elkhart; American Motors, South Bend; Continental Can, Elkhart.

I think we can safely say that Michigan has come out with the gold star. None of their municipalities are in violation, except if you deal with the two which are about 2,000, and Michigan has extended our time schedule, but they have a schedule for them. None of the municipalities or industries are in violation.

Wisconsin--and I am going to read a dismal litany or list, but I should indicate that most of these may be in violation because of that disinfection provision.

Franklin, Southern Colony, Grafton, Thiensville, Cedarburg, Menomonee Falls, Milwaukee, Metro Sewer Commission (Jones Island Plant), Kiel, Plymouth, Clifton, North Fond Du Lac, Portage, Kimberly, Appleton, Little Chute, Kaukauna, New London, Clintonville, Oconto.

Wisconsin industries: J. I. Case and Company and Baily's Harbor Laundry.

Federal installations: Great Lakes Naval Training Center, Fort Sheridan, for which the President in his message has provided funds and asks them to provide treatment.

Summary

I would say to the States involved that all these industries and cities I think on a prima facie basis may be considered to be contributing to interstate pollution and they may be subject to 180-day notice by the Federal Government, whatever else we may do. So if this comes, it should be no surprise to the States to know they are in violation.

I make no final judgment as to any of these as to the exclusiveness of the list, or that this preliminary information might not be subject to change on further close examination, or that there might not be a good and sufficient reason for any of these industries or communities not to be in compliance with the requirements, and, in the sense of justice and equity, it may not be appropriate to proceed against them. But this is the list that we have now.

Again, if you look at this as a whole, I don't think this is a bad record. I think if you look at the kind of violations, a lot of these are not really gross violations, but they are just violations of a portion of the requirements. However, if we are going to move ahead for a clean Lake Michigan we have to get everyone up to par.

MR. POOLE: Mr. Chairman.

MR. STEIN: Yes.

MR. POOLE: I don't have the advantage of that list you are reading from, but I believe most if not all of those Indiana industries you read are in the St. Joe Basin and they have until 1972. So I just want the record to show that I don't consider they are in violation at the moment.

MR. STEIN: Presumably--

MR. POOLE: You might take a Michigan list, if you could study all that fine print, and find a tremendously long list that is in the same category as those Indiana industries.

MR. STEIN: Mr. Poole, I must say that I have no judgment on this. This is a staff report from our people. But presumably they felt they were in violation of interim dates. Is that correct?

MR. DUMELLE: Yes.

MR. STEIN: That is my understanding.

Now, as I said, if our staff is wrong on any of these, you can be sure that will be thoroughly checked without action being taken. We do have one month to go into this. I think this will be one of the advantages of having that check list that I indicated of those seven interim steps for compliance, so we are all in agreement with that and we know what we are talking about. This will cut down any misunderstandings that the States or we or the industries and the municipalities may have with compliance with interim dates.

MR. POOLE: Well, I just want to elaborate or comment a little bit on that. That is the first I have heard of interim dates from the staff, was within the last week or so. But if you look into the Indiana plan rather than the dates--and I think we did document for preliminary plans, final plans and the award of contracts and completion--we had a schedule in the back of each report. And I don't remember the time that was allowed, but it was one schedule for small projects and a different schedule for larger projects. Many of these industries are small, and I think if you will go back to that schedule they are probably not in violation. Just a week or so ago we heard from Mr. Mayo that he wanted this list of interim dates. I wasn't aware until today that this was a matter of departmental policy. We hear so many things these days from your Regional Offices that when you run them down it is something that originates with the Region and I never know when it is coming from the horse's mouth.

MR. STEIN: Well, I hear a lot of things from the Regions, too, and you know I have to hear from nine Regions, you might hear from one.

MR. POOLE: Two.

MR. STEIN: Two, yes. But I can assure you this is from the horse's mouth if the horse has a mouth.

MR. KLASSEN: Can I ask the horse a question?

MR. STEIN: Yes. (Laughter.)

You know, when he was talking, when I heard that agricultural lecture this morning on the cows and the distribution of animals, I was glad he didn't indicate the kind of animals extant mostly in Washington or the parts of them. (Laughter.)

MR. KLASSEN: I will have to make a report to our Illinois Sanitary Water Board on this and this is purely for clarification. What is U. S. Steel, Waukegan Works, in violation of?

MR. STEIN: Mr. Dumelle?

MR. DUMELLE: This would be a date as listed earlier by this conference, Mr. Klassen.

MR. KLASSEN: A what?

MR. DUMELLE: One of the interim dates listed in a previous session of the conference.

MR. KLASSEN: For what?

MR. DUMELLE: Well, I will have to--

MR. KLASSEN: Lake water quality?

MR. DUMELLE: --find it.

MR. KLASSEN: I am just asking for information. I have got to make a report to our Board and I just want to make certain that I am quoting you correctly.

MR. DUMELLE: There is a December 1968 construction schedule date.

MR. KLASSEN: What did they mean? I mean what are they in violation of, your December 1968 construction date?

MR. DUMELLE: I think it is your date, Mr. Klassen.

MR. KLASSEN: But you are saying they are in violation. I am asking you what they are in violation of and I presume you are basing it on some Federal standards and I am just asking for information. What State-Federal water quality standards are they in violation of? I merely want to report this to my Board because if they are in violation, then we are going to have to take some more drastic action.

MR. DUMELLE: Well, I think the answer is what I have been trying to say--that it is a date as you submitted to us that they are not on the schedule. It is not the Federal water quality standards at all because we haven't checked those.

MR. KLASSEN: I am still trying to find where these dates are, Mr. Dumelle. I don't know.

In other words, we are not in violation of any of your water quality standards or dates?

MR. DUMELLE: Well, not of the water quality standards. Now, the dates are what we are talking about.

MR. KLASSEN: Any of your dates?

MR. DUMELLE: The dates of the conference as you submitted them, as I understand it, for this particular industry. You said it would be done by such-and-such a date. It has not been done.

MR. KLASSEN: In other words, they are in violation, then, of the State of Illinois date and not the Federal date?

MR. DUMELLE: Well, it is a joint conference. I would assume that it is a joint date that everybody has agreed upon as you submitted it, and it was accepted by the conference. All we are saying is we are looking at that and--

MR. KLASSEN: They are in violation of that date in what respect? What more do they have to do?

MR. DUMELLE: Well, they would have to complete the construction, which I believe you were to depend upon that they would do by the end of the year, as I recall the date.

MR. POOLE: I don't want to belabor this, Mr. Chairman, but I am reading here from the findings, pages 18 and 19 of the report of the first conference says, "Industries not connected to municipal sewer systems are to provide treatment so as not to result in degradation of Lake Michigan's water quality and to meet the water quality standards of Lake Michigan as approved by the Secretary of the Interior and the appropriate State water pollution control agencies of Illinois, Indiana, Michigan and Wisconsin. This action is to be substantially accomplished by December 1972."

We keep talking about the conference dates, and as far as I know this is the only conference date that we have had up until today.

MR. DUMELLE: Well, it gets back to the submissions of the conferees with the dates as submitted by the States which were accepted by the conference. I think, Mr. Chairman, this is something for you to rule upon. Here is the list and here is the date, December 1968, and this is what we are going by.

MR. STEIN: Presumably, as I understand it, let me see if I state it correctly, we have had various progress reports with dates submitted by the States on what they were going to do and these dates have been violated.

MR. DUMELLE: Yes, sir.

MR. STEIN: Is this correct?

MR. DUMELLE: Yes, sir. We are holding them to their own dates. Now, if they want to extend them, that is another thing; but this is what we are going by, their own check list.

MR. STEIN: Well, we will take this up at the executive session. Now, if you believe that these dates are irregular or the dates that you have submitted in the past which our staff has them violating is in error, we will be glad to have that, and I am sure we will give them full publicity if that is not correct.

MR. KLASSEN: Let me clarify my question. I am not saying anything about whether the dates are or are not valid. I merely asked what they were in violation of so I could report and I think you have answered it.

MR. STEIN: Right.

Are there any other questions?

MR. FRANGOS: Mr. Chairman, may we have a copy of that listing?

MR. STEIN: Oh, certainly.

MR. FRANGOS: Is it available?

MR. STEIN: Certainly. And you don't have it more than five minutes after I got it.

We have several copies of the listing here.

MR. FRANGOS: I have just a comment on our listing. I think you are correct that all of those on the Wisconsin list relate to chlorination.

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MR. STEIN: Yes. I thought I said that. Again, and I don't want this to be pushed out of proportion, obviously the one we know about, for example, the Milwaukee-Jones Island Plant, this plant has secondary treatment. The only thing you are talking about is disinfection. And I think that has to be recognized.

Are there any other comments or questions from the conferees?

This has been a very useful meeting and I think we can see the direction in which we are moving. As a matter of fact, let me state that except for a very few cases, we might consider that this program is pretty much on schedule. The variances we have, as far as I am concerned, are relatively minor. That does not mean that in an individual case we do not intend to get these cleaned up, nor does it mean to that individual community it might not be a strong or an expensive operation. But this is all relative. We have heard testimony saying that it would cost Milwaukee, the Jones Island Plant, maybe $6 million to install disinfection equipment. When you talk about relatively minor adjustments, anyone who has to spend $6 million might not consider that so minor. I think as far as the lake as a whole is concerned we are pretty much on schedule, but we intend to go ahead with it.

Now, I will say this--at the end of next month, what we are going to try to do is get you this little booklet, with all these dates lined up, so that everyone will be able to make a judgment on whether everyone is in line with these interim dates, or whether we know them, or whether they are not in compliance. As they say, you can't tell the players without a scorecard. You will be able to make your own judgment.

In addition, I would like to say this to the conferees: From the reaction we got from the citizens here and our own push, I think we had better come to an agreement very, very rapidly on the requirements we are going to have for thermal discharges. Time is running out--we don't have very much longer. I don't think we are going to adduce very much more information in the near future. I am not sure we are very far apart. I see no reason why, at the next meeting we have in a month, we should not be able to come up with proposals from all of you which will enable us to come out with a recommendation on thermal policy. I hope you people can see fit to adopt these as regulations and we can see fit to approve them.

Any other comments or questions?

MR. PURDY: Just one comment, Mr. Chairman, and that is although they are substantially in compliance with the time schedules today, I would think at future meetings that this will become more binding. We will be running into the large expenditures of money, such as the North Shore Sanitary District and others in all the other States, where it means now putting the cash on the line. In our own experience in our State, we seem to have corrupted the minds of our people into believing that they must have State and Federal grants before they proceed with their construction. If we are going to maintain our December 1972 objective in all cases, it seems to me that there has got to be a realigning of thought within our communities and some will have to go it alone, so to speak, without grant funds.

MR. STEIN: I think that is well taken.

Again let me put it this way. Even with all the money we have had, when you take the amount that the Chicago treatment costs; we have a plant in Cleveland where they voted $100 million; a plant in Manhattan is costing $220 million; that is more than our total appropriation last year; plants in Atlanta, etc., plants in Detroit; in your State--I don't think that those big cities ever thought they were going to get a 30 or 50 or a 75 percent grant. Given the arithmetic on this even with all the money available,the big cities just couldn't think that they would get a large grant when they began construction. I am not talking about the question of reimbursement for a relatively small portion of the budget. For example, I am not sure in New York City when they construct this project that they are going to have a Federal grant amounting to more than 4 percent.

And I think this has to be recognized. If we are going to meet this time schedule, a lot of the cities are going to be faced with the problem of going it alone.

Are there any other questions?

If not, thank you all for coming and we stand adjourned.

(Whereupon, at 4 o'clock, an adjournment was taken.)

(The following statement was submitted for the record by the Lake Carriers of Cleveland:)

CONFERENCE CONCERNING THE MATTER OF POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN

(Wisconsin, Illinois, Indiana and Michigan)

STATEMENT OF LAKE CARRIERS' ASSOCIATION

It has come to the attention of Lake Carriers' Association that in response to the joint request of the Governors of Illinois, Indiana, Michigan and Wisconsin, the Secretary of the Interior, pursuant to Section 10 of the Federal Water Pollution Control Act, as amended (33 USC, Sec. 466, et seq.), convened the third session of the Conference in the Matter of Pollution of Lake Michigan and its Tributary Basin, on March 31. 1970. This statement is submitted for the record of such conference.

The vessels owned by the member companies of Lake Carriers' Association constitute better than 98% of the total American Flag Great Lakes bulk cargo fleet. The Great Lakes fleet includes nearly 500 vessels with a total trip-carrying capacity in excess of 5 million tons. About 54.4% of the tonnage is of United States registry and 45.6% Canadian registry. Virtually all of these vessels at one time or another trade into the ports of Lake Michigan. The owners of these vessels are, therefore, directly and immediately concerned with any recommendation of the conference which would in any way prohibit or delay maintenance dredging in any of the ports of Lake Michigan.

There is a complete lack of evidence that open lake disposal of dredged material contributes to lake pollution. In the absence of such evidence, careful consideration must be given to the repercussions that will result from such a prohibition. As presently proposed no maintenance dredging could proceed until confined areas for the disposal of dredged material are located and suitably diked. The Corps of Engineers estimates that to locate such areas, arrange for funding, and construction of the necessary dikes capable of holding at least 10 years' dredgings would require one or more years.

The two-year pilot study of harbor dredging recently completed by the Buffalo District, Corps of Engineers, indicates that annually 1.9 million cubic yards of material are dredged from the harbors of Lake Michigan. This amount is exceeded only by the amount of material dredged in Lake Erie. The figure further indicates the enormous size of the disposal areas that will be required.

The pilot study further shows that the disposal of dredged material in diked areas is also very costly. Of the thirty-five harbors selected for study, 18 were on Lake Michigan. Annual maintenance dredging of these harbors would soar to $4,085,000, an increase of $2,489,000 over present-day dredging costs, and this increase does not include the cost of locating and constructing the necessary diked areas. Consequently, this is an extremely expensive project, particularly when there is no real evidence that open lake disposal of dredged materials contributes to pollution in any way that is significant.

Apart from increased dredging costs and the cost of constructing disposal areas, those who are dependent upon Great Lakes shipping would be seriously affected if no maintenance dredging is performed in Lake Michigan harbors during 1970 and 1971, the probable minimum period required to provide suitable disposal areas.

Using Indiana Harbor and the Calumet River and Harbor as examples, the Corps of Engineers advises that these areas shoal to the extent of approximately 2 feet per year. The material consists mainly of silt with annual dredging required if adequate channel depths are to be maintained.

During the 1968 navigation season, which is the most recent year for which complete statistics are available, Indiana Harbor handled a total of 19,111,434 net tons of cargo. The same year South Chicago handled a total volume of 24,736,022 net tons of cargo. Involved in this traffic were 1,239 vessel arrivals and clearances with drafts of 20 feet or more at Indiana Harbor and 1,788 vessel arrivals and clearances at South Chicago with drafts of 20 feet or more.

Conservatively estimated, the average Great Lakes bulk cargo vessel floats approximately 60 gross tons of cargo for each inch of draft. On this basis, the loss of 2 feet of draft would reduce the average cargo by 1,440 tons and the amount of cargo for the season for these particular harbors would be reduced by 4,352,880 net tons. Assuming a transportation cost of $2 per ton, the total projected loss to the vessel industry with respect to Indiana Harbor and South Chicago alone, if dredging operations are not performed would be a minimum of $8,717,760 per year. Of course, this loss will be much greater if the remaining major harbors on Lake Michigan are not included.

The Great Lakes vessel industry, as much as anyone, is interested in a clean lake and the industry readily recognizes the need for practical, effective pollution control regulations. If, in fact, the disposal of dredged material does create a pollution problem, the vessel industry would be the first to admit that appropriate steps should be taken. It is not realistic, however, to arbitrarily cease all maintenance dredging until an alternative method of disposal is found. The immediate injury such a program entails to the users of water transportation would be many-fold over that which the vessel industry alone would suffer.

We urge that maintenance dredging in the harbors of Lake Michigan not be arbitrarily suspended.

Wisconsin Ecological Society
P.O. Box 514
Green Bay, Wis. 54305

April 14, 1970

Mr. Murray Stein
FWPCA
U. S. Dept. of Interior
Washington, D. C. 20242

Dear Mr. Stein:

Enclosed is a copy of our April 14th letter to Francis T. Mayo of your Chicago office and the talk given by John F. Wilson at the March 31st Lake Michigan Conference reconvening.

Cordially,

R. J. Barlament
Secretary

b

COPY

April 14, 1970

Mr. Francis T. Mayo, Director
Federal Water Pollution Control Agency
Federal Building
Chicago, Ill.

Dear Mr. Mayo:

At the reconvening of the Great Lakes Conference in Milwaukee on March 31st of this year, I presented a short paper on behalf of the Wisconsin Ecological Society, a copy of which is attached.

Specifically, we ask for a reduction in five-day BOD loads to the Fox River to a total of 27,675 pounds per day from the paper mills. We also request the FWPCA to ask the Wisconsin Department of Natural Resources why, in view of the 1966 Federal guidelines adjusted to a total of 60,975 pounds from the mills, the new DNR orders permit a total of 87,065 pounds of five-day BOD.

We also request the FWPCA to clarify its position on thermal pollution relative to Lake Michigan.

The horribly polluted condition of lower Green Bay makes it mandatory that the Federal government concern itself with this area immediately. We might suggest a reconvening of the conference in Green Bay.

We look forward to your response.

Cordially,

John F. Wilson
Director

b

cc - Thomas G. Frangos
Murray Stein

Wisconsin Ecological Society
P.O. Box 514
Green Bay, Wis. 54305

Paper presented by John F. Wilson, a director of WES. 3/31/70

We have 25-30 active members comprised of various scientists, including physicists, limnologists, chemists and ecologists, as well as lawyers, accountants and various businessmen. We have intensively studied problems of environmental degradation in our state for the last four years. We have made numerous suggestions, formally and informally, to the various responsible agencies. Parenthetically, some of us have wondered why, when as taxpayers, we have funded both Federal and state agencies to protect our environment, it has been necessary to spend additional time and money as private citizens to assure that this protection does, in fact, exist.

We believe that, when value judgments are made by various agencies, the public interest is not always held foremost, or that the judgment presumes a benefit to the public not in keeping with ecological principles, resulting in an ultimate cost to the public out of proportion to the alleged benefits.

Specifically, we feel the classification of the lower Fox River in Wisconsin by the Department of Natural Resources to an industrial cooling stream category is a case in point. We feel that the Corps of Engineers, in allowing Fort Howard Paper Company to fill in the Fox River behind a new bulkhead line without a public hearing, was not acting in the public interest. We feel that both the FWPCA and the Wisconsin DNR share responsibility for permitting nuclear power plants on the shores of Lake Michigan to discharge large amounts of hot water, together with radioactive wastes, into the waters of Lake Michigan.

Unless the rivers with their pollutional loads are upgraded, the hope for upgrading Lake Michigan is an impossible dream. According to a number of experts, lower Green Bay is already a Lake Erie. We have been informed by members of the FWPCA staff that the Federal government views Green Bay as a problem existing for Michigan and Wisconsin, with an imaginary line drawn from Rock Island to Menominee, that a specific pollutant must cross that line before the Federal government can act. The Society views this as absurd. Green Bay, by any measurement, is a Federal water course, and we expect the FWPCA to act on matters affecting Green Bay.

In 1966 the FWPCA made comprehensive reports on the Green Bay basin, the parameters of which were excellent, and in which the problems were discussed in depth and recommendations made. The polluters were identified, together with their contributions, a pilot model of the Fox River was created, and reductions in loadings were requested.

The paper mills constitute the largest single source of pollution to Green Bay by far. The recommended FWPCA numbers were 76,475 pounds of five-day BOD per day from the Fox River mills. We feel that the FWPCA was too generous, and we will not save Green Bay with this sort of action. We must deduct from these totals, however, the 15,500 pounds allowed to Kimberly-Clark Corporation in Kimberly because that mill's pulp operation was recently shut down. We then have a total of 60,975 pounds. Recently the Wisconsin DNR issued new orders to the mills on the Fox River calling for a reduction to 67,065 pounds per day. We are asking the FWPCA to inquire why the discrepancy exists, and when a reduction to at least 60,975 pounds of five-day BOD from the mills will be implemented.

The Fort Howard Paper Company recently indicated that it would reduce its discharges by 90%. If this is possible for this company, with one sort of technology or another, it should be possible for the others. We are formally requesting this conference to ask Wisconsim to demand that all the mills live up to the state or the art and reduce their BOD and suspended solids loadings by 90%. These are the levels expected of the municipalities and should be demanded of industry as well. The present levels are 276,740 pounds total five-day BOD per day; we ask for 27,674 pounds, and a comparable reduction in suspended solids.

We view the permission to allow the nuclear power plants to discharge their hot water in Lake Michigan as a violation of the intention of both Federal and Wisconsin law. No one can say, accepting the fact of a thermal bar and the current movement in the lake, that hot water will in fact mix completely in the lake. Shore areas likely will be affected to a larger extent than the entire lake. The concept of "mixing zones" must be restudied while asking if they are established in the public interest or for some other reason. There are many menacing unknowns--if we see a scientist take one position on hot water, another can be found to take the other. The effect of hot water on other forms of pollution, fish, aquatic life and algae might be substantial. It would seem minimally prudent to restrict these discharges until more is known about the effect.

We pose a question: if the AEC is wrong, and tritium not only concentrates in the biological chain but causes harm once it does, who will have the responsibility of dealing with a hopeless Lake Michigan--the AEC or the FWPCA? The DDT disaster must make us aware that we can guess wrong. If we are wrong on the deliberately discharged radionuclides from the nuclear power plants, we will have a mess by orders of magnitude greater that the DDT situation.

We request that you err on the side of prudence and care.

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